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**ORIGINAL COMMUNICATIONS.**

(Original Communications are received with the understanding  
that they are contributed exclusively to THE LARYNGOSCOPE.)

**SOME OBSERVATIONS ON THE TREATMENT OF HAY-FEVER, WITH A REPORT OF 24 CASES TREATED WITH POLLEN SOLUTIONS AND 22 CASES TREATED BY THE ADMINISTRATION OF CALCIUM CHLORID.\***

DR. HAROLD WILSON, Detroit, Mich.

There is a certain group of clinical symptoms to which a great variety of names has been given; names derived usually, from the real or apparent cause upon which the symptoms depend. Hay-fever, rose-fever, linden-fever, lacquer sickness, serum sickness, vaso-motor rhinitis, egg sensitization and so on, through a long list, are examples of this diversified nomenclature.

These symptoms in general are:

A. *Characteristic.* (Symptoms of one or more groups always present). 1. Itching, redness and oedematous swelling of the skin or mucous membranes, e.g. of the body, mouth, throat, nose, eyes, etc. (This includes miscellaneous skin symptoms, such as urticaria, eczema, herpes). 2. Sneezing, lachrymation, rhinorrhea. 3. Asthma (bronchial type), cough, glottic stenosis.

B. *Miscellaneous.* (Symptoms of one or more groups often present). 1. (General), Fever, malaise, chills, asthenia. 2. (Special), Vomiting, diarrhea, cardiac and respiratory disturbances, swelling of lymph nodes.

The number of substances already known to be capable of giving rise to this characteristic symptom-complex is very large. In the

\*Read before the American Laryngological, Rhinological and Otological Society, White Sulphur Springs, W. Va., May 5, 1916..

tables of Lübbert-Dunbar are given the names of more than fifty plants to the pollen of which some of their hay-fever subjects were sensitive. This list is now undoubtedly greatly enlarged by subsequent observations. To this we may add many fruits, such as strawberries, raspberries, pears, bananas, melons, etc.; vegetables, such as tomatoes, celery, spinach and other greens; fish; crustacea (lobsters, crabs); mussels (oysters); various worms, such as bothriocephalus, *tænia*, the common earth worm; insects, such as ephemeris; toads and frogs; eggs, milk, various meats, etc.

Now all these substances contain special protein bodies, and it has been shown with pollens, at least, that this protein is the active agent in causing the symptoms in question. A theory based on the presence of a hypothetical and specific proteolytic ferment in the sensitized body, has been proposed to explain the phenomena observed.

However, it is also a well-established fact that this same symptom-complex may be caused by a large number of substances which contain no protein whatever. Some of these substances are quinin, mercury, iodon, tannin, choral hydrate, sulphonal, ipecac, antipyrin, phenetidine, salol and other salicylates.

This fact cannot well be explained by the hypothesis relating to protein sensitization, but there would seem to be no logical reason why the vaso-motor mechanism concerned in the production of the sensitization-syndrome may not be set in operation in more than one manner, and when we are able to analyze the matter more fully, we may find some simple or more fundamental facts of physiological chemistry at the bottom of the whole series of phenomena.

The study of sensitization is the study of individuals, rather than of averages. There is something in the sensitized individual which has made his sensitization possible. For convenience, we call this a "disposition," or "tendency." Its obverse is "resistance" or "immunity" and we know this also as individual, specific and racial. At the present time, we are in no clear way to formulate any entirely satisfactory theory of sensitization. On the one hand, it appears to be closely related to what we know as anaphylaxis, although possessing what seem radical and essential differences: on the other hand, it touches, perhaps, alterations in the relations of the endocrine glands; in any case, it is probably a matter of body chemistry, and I believe that its explanation will eventually come less from clinical observation than from laboratory research.

It is the purpose of this communication to bring together a few observations relating to the treatment of that form of sensitization

known as "hay-fever" and to report one series of cases treated by the injections of pollen solutions and another series treated by means of the administration of calcium chlorid.

*Treatment of hay-fever by specific protein de-sensitization.* Except for desultory references, no report of this method of treatment appears in medical literature until the publication of the work of Noon and Freeman.<sup>1-2-3</sup> Following the stimulus of this work, numerous other observers<sup>4-5-6-7-8-9-10-11</sup> made trial of pollen solutions, and at present the method is being exploited by several manufacturers as a commercial enterprise.

#### TECHNIQUE.

*Gathering the pollen.* To gather a large amount of pollen is a laborious undertaking. I know of no better method than to place under the flowering plants, with their stems in water, glazed or other smooth paper, so as to catch the dropped pollen, which is very light, easily floating off into the air. The pollen which has fallen on the paper may be swept up with a camel's hair brush. By sifting the collected material through an extremely fine cloth sieve, it may be rid largely of insects and other extraneous matter. If thoroughly dried either in the air, or better, in a desiccator the pollen may be placed in a clean, dry bottle and will keep well at least for one year.

*Preparing the pollen solutions.* In preparing the pollen solution it is essential to select a method by which the active protein component may be extracted from the pollen as completely as possible, without loss of its active properties. It has been found by Kamman<sup>12</sup> that the active constituent of rye (and presumably of other pollen) is an albumin. It is therefore soluble in water, and under ordinary conditions in NaCl solutions.

Various methods have been proposed. Dunbar used alternate freezing and thawing. Clowes (I.c.) treated the dried pollen with acetone, and after evaporating to dryness, incubated with a NaCl solution. Kœssler (I.c.) adopted the following method: One centigramme of pollen is broken up as finely as possible in an agate mortar, and gradually 10 c.c. of an 8.5 per cent solution of NaCl is added drop by drop. This is then shaken for two hours and incubated at 37° for sixteen hours, centrifugalized, and the super-natant fluid removed with a pipette. Cooke's method (I.c.) is as follows: Dried pollen, or the polliniferous portion of the flower is ground in a mortar with sand, using a n/200 NaOH and 0.9 per cent NaCl solution. It is then shaken for twenty-four hours, filtered first through sand and then through a sterile Berkefeld filter. The nitrogen content of the solution is then determined by the Kjeldahl method. The

nitrogen content is the determining factor for the solution, doses being expressed in fractions of a milligramme of nitrogen.

In order to compare some of these methods, the writer made the following experiments:

Small quantities of mixed ragweed and goldenrod pollen were treated as follows:

- A. 1. Mixed with 5-10 c.c. of 0.5 per cent saline solution.
2. Moistened with a small amount of water and triturated in a porcelain mortar for fifteen minutes.
3. Treated with acetone, evaporated to dryness and 5-10 cc. of saline added.

All three samples were then incubated at 37° for 24-36 hours and examined under the microscope. The pollen grains in samples 1 and 3 appeared unchanged. Those in sample number 2 were largely broken up and disintegrated.

- B. 1. 0.3290 gm. water-free pollen were treated with 1 c.c. acetone, evaporated to dryness, 30 c.c. saline solution added and incubated 24 hours.
2. 0.1814 gm. water-free pollen were ground dry in a Wedgwood mortar for one and one-half hours, 30 c.c. saline added and incubated 24 hours.
3. 0.330 gm. water-free pollen, 30 c.c. saline added and incubated 24 hours.
4. 0.476 gm. water-free pollen, 1 c.c. saline added and the whole frozen and thawed four times, then 29 c.c. saline added and incubated 24 hours.

These several solutions were then filtered through tared filters, washed thoroughly and the residues dried to constant weight. The results of these various methods were as follows:

- Sample number 1 lost 21.2 per cent in weight.  
Sample number 2 lost 33.9 per cent in weight.  
Sample number 3 lost 24.9 per cent in weight.  
Sample number 4 lost 25.6 per cent in weight.

As far as this single experiment goes, it appears that when the pollen grains are broken by trituration, a larger amount of soluble matter may be extracted by 24 hours' incubation than by any of the other methods tried. Moist trituration seems to be more effective than dry, and should be aided by the addition of sand or powdered glass. The amount of trituration necessary may be determined by the examination of a small portion of the ground material under the microscope.

Having ground a weighed portion of the dried pollen in an agate mortar with a small amount of water or saline solution, more salt solution is added and the whole incubated for 24 hours. At the end of this time, the mixture is centrifugalized at high speed and the clear super-natant fluid used as a basis for subsequent dilutions. If 0.025 gm. of dried pollen are taken and the final solution made up to 25 c.c. each cubic centimeter will contain the soluble matter in 0.001 gm. of dried pollen. From this, weaker solutions may be made by dilution as required. If the method of Cooke be employed, it is quite unimportant how complete the extraction has been made, or whether any fraction of the protein has been retained by the

Berkefeld filter, or lost in any step of the process, since it is only in the final solution that the determination of the contained nitrogen is made, and upon this finding the final dilutions are made. The method, however, requires more chemical training than most physicians possess.

*Strength of solutions.* Noon (l.c.) established the value of a unit of pollen solution as "the quantity of pollen toxin that can be extracted from the one-thousandth part of a milligramme of *Phleum* pollen." Clowes considered a unit as 0.000,000,05 gm. of pollen. Kessler says "we understand as the unit of pollen toxin the 1-100th part of a millionth of a gramme of pollen proteid" although he writes it equal to 0.000,001 gm.

In general, it has been agreed that the unit devised by Noon shall be adopted; that the term "pollen unit" means the soluble protein contained in 0.000,001 gm. of dried pollen, and this is the value understood wherever the term is hereafter employed in this paper. It is a convenient quantity, and one into which the nitrogen value, if determined, may be easily translated.

*Size of dose.* No very definite uniformity exists as to the dosage of pollen solutions. Noon and Freeman advised giving for the first dose  $\frac{1}{3}$  e.c. of the minimum dilution necessary to elicit the ophthalmic reaction; for the second and third doses, 50 per cent more than the first, and for the other doses, 100 per cent more than the first. Clowes gave 0.000,008 gm. for the first dose, and increased the dose by 50 per cent until a maximum of 0.000,025 gm. was reached. Lowdermilk gave 0.000,025 gm. for the first dose and increased it to 0.001 gm. Ulrich gave from 0.000,000,005 gm. to 0.000,001 gm. Kessler gave for the first dose, one-half the quantity necessary to produce the ophthalmic reaction, and gradually increased the dose.

The attempt to determine the initial dose by means of the ophthalmic reaction is, in the experience of most observers, highly unsatisfactory, since, in the first place, to determine the minimum quantity necessary to produce the reaction is both laborious and uncertain, and further, granting that it could be determined with a limiting error of, say, 0.000,005 gm. of pollen solution, it would even then be quite unnecessary, as it can be shown clinically that arbitrarily to begin with one or two units is entirely safe, and vastly easier. As to the size of subsequent doses, this is to be determined by experience and by the facts observed in the individual patient under treatment. The sequence of doses used by the writer will be found in the case-reports given later.

Neither has the maximum dose to be given been definitely fixed. Several authors have selected 1000 units as the maximum. Others

are much below this quantity. At present, it seems as if any definite amount must be a purely arbitrary selection. I am convinced that in many, if not in all cases considerably more than 1000 units may be safely given after a sufficiently extended preliminary de-sensitization.

*Frequency of dose.* Injections of pollen solution are given variously at intervals of from one to ten days. No fixed rule has been established. It is considered unwise to give an injection during the continuance of what are called negative reactive symptoms due to a previous injection. Ordinarily, intervals of 3—5 days may be employed safely, and are in most common use.

#### THE TREATMENT OF HAY-FEVER BY MEANS OF CALCIUM CHLORID.

The initial inspiration to the use of calcium salts in the treatment of hay-fever seems to have been given by Wright<sup>13</sup> who noted their value in relieving the urticaria due to the eating of fruit, and that arising from the use of diphtheria antitoxin. Chiari and H. Januschke<sup>14</sup> noted the fact that in hay-fever and other rhinitides with abundant nasal secretion, calcium lactate  $\frac{3}{4}$  gm. *pro die* relieved the symptoms. R. Hoffmann<sup>15</sup> reported on the use of calcium salts in hay-fever and bronchial asthma having had favorable results. Kayser<sup>16</sup> treated in 1912, one light case of hay asthma, and thirteen cases of typical bronchial asthma with calcium chlorid with good results, giving a 5 per cent solution. Emmerich and Loew<sup>17</sup> reported five cases of hay-fever. All had taken CaCl<sub>2</sub> about 1.0 gm. t.i.d. for a long period of time, and all experienced almost complete relief from hay-fever symptoms. In a second communication, these authors<sup>18</sup> state that the five patients cured by the use of calcium chlorid in 1913 had no return of the disease in 1914, having taken the drug more or less continuously in the interval. They report eight new cases similarly treated, and all were either entirely relieved, or had only the most trifling symptoms.

*Dosage.* The preparation and dosage are very simple. Calcium chlorid crystals, 100. Distilled water, enough to make 500. S. Take one teaspoonful in sufficient water, with or after each meal.

Patients have generally little or no difficulty in taking the drug as prescribed. There would seem to be no reason why it could not be made more palatable if desired. One of my patients complained of gastric distress and was obliged to reduce the size of the dose. Another complained of increased frequency of urination, and several of slight constipation. Patients having impaired kidney function might have to be watched, but in general there are no contraindications to its use.

*Mode of action.* That salts of calcium play an important part in body metabolism has long been known, although their exact functions are not altogether well determined. Emmerich and Loew claim that they (1) increase bodily energy, capacity and resistance; (2) relieve insomnia; (3) increase resistance against infection; (4) relieve tendency to nasal catarrh, laryngitis, bronchitis, etc.; (5) inhibit auto-intoxication. These claims do not appear to be justified by what is known of the physiological action of the drug, and must be considered to rest upon hardly more than an empirical opinion.

Lime salts have an important, if not essential, part in the activation of certain body ferments or pro-ferments, such as rennin, thrombin and trypsinogen. They are found also in the white blood corpuscles. There is a certain relationship between the parathyroids and the lime salts of the body. Hypo-parathyroidism is associated with lime deficiency, and tetany resulting from parathyroidectomy may be relieved by the administration of lime salts. This result, however, may also follow the administration of salts of the other alkaline earths, such as magnesium. It has been observed, both clinically and experimentally, that lime salts have a marked effect in lowering the irritability of the nervous system. (Sabbatini).

From such a survey as we can make of the relation of calcium salts to bodily processes, their influence upon hay-fever appears to admit of no very certain explanation based upon what is known as to the essential nature of the disease. Since, however, the clinical symptoms of this disease are dependent upon the mechanism of the vaso-motor system for their expression, and are due to an irritation of this system, it would seem probable that if calcium salts lower the irritability of nervous tissue, the benefits secured by their administration are due to this property, rather than to a more hypothetical influence upon the enzymatic activity of the body cells. At present, the role of specific proteolytic or other ferments in the production of hay-fever is largely hypothetical, however attractive the hypothesis, and to assume that calcium salts are of value in this disease in consequence of their action on cellular or other body ferments, is only to add one hypothesis to another.

During the past two years I have had a number of hay-fever patients under observation and treatment, the details of which are here given:

#### TREATMENT BY MEANS OF POLLEN SOLUTIONS.

*Cases in 1914. Case 1.* C. B., age 22. Autumnal hay-fever many years with asthma. Ophthalmic reaction to mixed ragweed and

goldenrod pollen, markedly positive. Hypodermic injections of mixed pollen solution beginning July 25, as follows: 3, 8, 25, 70, 100, 200, 300, 300 units, two to five day intervals. Patient left the city for the East about September 1, and reported later by letter saying that he had had very little hay-fever at any time during the entire season.

*Case 2.* D. K. B., age 30. (See also 1915, case 31). Autumnal hay-fever nine years, no family history; some asthma. Ophthalmic reaction marked to mixed ragweed and goldenrod pollen. Treatment begun with mixed pollen solution beginning with three units July 28, and continued every two to four days until September 19, as follows: 3, 5, 15, 50, 100, 90, 150, 250, 200 (this dose was given August 19, and was made from freshly gathered ragweed pollen. It was followed by a marked reaction. There was much edema of the face and eyelids and some asthma, coming on within an hour after the injection and lasting twenty-four hours); 200, 275, 350, 400, 500, 500, (ophthalmic reaction still marked), 800, 800, 1000, 1000 units. Beginning August 17 the patient had slight hay-fever symptoms, gradually increasing in severity, but on the whole, experienced enough relief to be classed as "moderate improvement."

*Case 3.* C. S., age 14. Autumnal hay-fever seven years, very light for two years past. No family history. Ophthalmic reaction to mixed goldenrod and ragweed pollen positive. Treatment begun August 3 with three units and continued every three to five days as follows: 8, 20, 60, 80, 200 units. At this time (August 17) the patient was having hay fever symptoms rather worse than usual and discontinued treatment.

*Case 4.* Miss C. (See also 1915, case 20). Autumnal hay-fever fifteen years. Asthma until five years ago, none since. Had a light attack of hay fever last summer lasting about four weeks. Ophthalmic reaction to mixed ragweed and goldenrod pollen positive. Treatment begun with mixed pollen solution July 28. Ragweed alone was used in this and in the other cases treated during 1914, after August 19. Injections every 2-5 days as follows: 3, 6, 8, 25, 50, 100, 90, 150, 200, 200 (fresh ragweed pollen solution, followed by marked reaction coming on within 15 minutes after the injection. Ears felt hot and full; felt very ill as if she would die; eyelids very edematous; itching of palms and of skin generally; asthmatic attack; erythema on various parts of the body, particularly about the site of the injection), 100, 200, 300, 400, 500, 500, 800, 800, 800 units. The patient reported herself as having had almost no hay-fever after September 14, and as having been in general, 20 per cent better than usual.

*Case 5.* H. I. A., age 27. (See 1915, case 15). Autumnal hay-fever since infancy, with asthma, great-grandfather was a "sneezier." Mother and one brother have hay-fever. Ophthalmic reaction to ragweed pollen, positive. Treatment begun July 28, injections at 2-3 day intervals; 3, 5, 20, 80, 125, 100, 150, 250, 200 (fresh pollen solution, followed by urticarial swelling of the arm, asthmatic attack and hay-fever symptoms), 100, 200, 200, 300 units. Patient left for Muskoka August 28, having had less hay-fever than usual up to that time.

*Case 6.* E. P., age 15. Autumnal hay-fever several years, not much asthma. Ophthalmic reaction ragweed, positive. Injections at 2-5 day intervals as follows: 2, 6, 20, 55, 100, 90, 150, 200, 200, 250, 300, 400, 500, 500 800 800 units. No reactions of moment. Hay-fever symptoms from August 17 were more moderate than usual.

*Case 7.* Dr. H. Autumnal hay-fever with occasional slight asthma for 15 to 20 years. Ophthalmic reaction ragweed positive. Treatment begun August 3 and continued every 2 to 5 days as follows: 3, 8, 65, 60, 150, 100, 200, 300, 400, 500, 500, 500 units. Patient left city September 4, reporting hay-fever symptoms to have been more moderate than usual.

*Case 8.* Dr. S., age 30. Autumnal hay-fever 15 to 20 years. Some asthma in 1909 and 1910. Had sub-mucous resection nasal septum operation April, 1912. Father has hay-fever, but for past few years only. No other sensitization known. Ophthalmic reaction ragweed, markedly positive. Treatment August 5 to September 4, as follows: 5, 14, 16, 30, 50, 100, 150, 200, 300, 300, 500, 650, 1000, 1000 units. September 4, ophthalmic reaction ragweed solution 1:100, positive. Patient had very moderate symptoms until first week in September, after which time, practically no symptoms at all. He said he "wondered almost, if there were any such disease as hay-fever."

*Case 9.* J. A. S., age 37. Autumnal hay-fever four years, becoming more acute each season. No family history. No asthma. Ophthalmic reaction ragweed, positive. Treatment August 14 to September 4 as follows: 25, 85, 100 (arm swollen about site of injection), 100, 200, 200, 300, 500 units. Asthmatic symptoms developed September 1 and became very troublesome. Hay-fever marked and distressing. In general, no improvement of symptoms.

*Case 10.* D. T. (See 1915, case 37). Age 27. Hay-fever several years. No asthma. No family history. Ophthalmic reaction ragweed, positive. Treatment August 27 to September 16 as follows:

20, 50, 100, 100, 200, 400 units. Patient reported in general, moderate improvement.

*Case 11.* D. P. R., age 41. (See 1915, case 17). Autumnal hay-fever many years. No family history. Ophthalmic reaction ragweed, positive. Treatment September 3-30, as follows: 25, 50, 100, 200, 300, 400 units. In general, symptoms slightly less marked than usual.

Five other patients were under treatment and either failed to report or left the city. For these, no report can be made.

*Cases in 1915. Case 12.* Mrs. E. S., age 35. Autumnal hay-fever nine years. Is dust-sensitive (road dust, house dust, etc.). Some flowers aggravate symptoms (carnations). Has severe hay-fever, with some asthma. No family history. Ophthalmic and cutaneous reactions to ragweed, positive. Cutaneous reaction, September 3, to pear, tomato, plum, celery, banana, all negative. Treatment, June 8 to August 25, 3 to 4 day intervals, as follows: 1, 2, 5 (arm sore and painful for 24 hours), 9, 20, 50 (erythema about site of injection), 80, 150, 300 (July 16, hay-fever symptoms for an hour or two, three days after injection), 450 (redness and swelling of arm after injection, also some hay-fever symptoms), 750, 850, 1000, 1000, 1000, 1000, 1000 units. August 17, sharp hay fever symptoms this morning, not related to injection. Patient placed on  $\text{CaCl}_2$ , 1.0 gm. t.i.d. Hay-fever symptoms at intervals during the season, but on the whole, rather less severe than usual.

*Case 14.* W. S., age 33. Autumnal hay-fever 10 to 12 years. No asthma. Three brothers and one sister have hay-fever, and one brother died (anaphylaxis), after an injection of diphtheria anti-toxin. Ophthalmic and cutaneous reactions to ragweed, very positive. Cutaneous reaction, August 31 to pear +, cantelope +, plum —, peach —, banana —, apple —, horse serum —. Treatment, June 8 to August 24, as follows: 1, 2, 5, 8, 20, 50, 100, 200, 300, 500, 700, 850, 1000, 1000, 1000, 1000, 1000 units. August 24, hay-fever symptoms began developing as usual and patient was given  $\text{CaCl}_2$  1.0 gm. t.i.d. September 14, hay-fever symptoms more or less marked. Reported later that symptoms continued during the season, possibly a little less severe than usual.

*Case 15.* H. I. A. (See 1914, case 5). Treatment (second year), June 9 to August 24, as follows: 2, 5, 10, 20, 50, 80, 125, 200 (slight asthmatic attack following injection), 300 (slight asthma), 450, 600 (marked asthma 15 to 30 minutes after injection, lasting 30 minutes), 700, 750, 850, 1000, 1000, 1000, 1000 units. August 24, left for Muskoka, having had no asthma (except that due to injections), and only the most trifling hay-fever symptoms.

Returned about the second week in September and had little or no hay-fever after this time.

*Case 16.* B. G. H., age 32. Autumnal hay-fever four years. One sister has hay-fever and is horse-sensitized. No asthma. No other known sensitization. Treatment, June 10 to September 4, as follows: 2, 5, 12, 30, 80, 300, 500, 700, 850, 1000, 1000, 1000, 1000, 1000, 1000, 1000 units. No report.

*Case 17.* D. P. R. (See 1914, case 11). Treatment (second year), June 2 to September 11. Cutaneous reaction, September 4, ragweed +, plum —, apple —, pear —, celery —, strawberry ++. Injections, 2, 5, 9, 25, 50, 100, 200, 300 (some hay-fever symptoms followed this injection), 600, 800, 1000, 1000, 1000, 1000, 1000 units. Patient out of the city in immune district August 14 to September 2. No hay-fever until his return, then symptoms developed with moderate severity, possibly, however, less than usual.

*Case 18.* Dr. A. A. G., age 45. Autumnal hay-fever 8 to 9 years. No asthma, but other symptoms severe. No family history. No other known sensitization. Ophthalmic reaction ragweed, very marked. Cutaneous reaction, August 31, ragweed +, pear —, plum —, banana —, cantelope —, peach —, apple, very faintly. Treatment, June 14 to September 11, as follows: 2, 5, 10, 25, 60, 125, 300, 500 (some local reaction), 700, 850, 1000, 1000, 1000, 1000, 1000 units. From about August 24 throughout the season, had more or less severe hay-fever symptoms, particularly after driving into the country, which he was obliged to do several times. On the whole, however, he thinks the symptoms were less severe than usual.

*Case 19.* H. R. B., age 26. Autumnal hay-fever since four years old. No family history. Knows of no other sensitization. Ophthalmic reaction ragweed, positive. Treatment by pollen injections, July 3 to August 28, then  $\text{CaCl}_2$ , 1.0 gm. t.i.d. Pollen injections as follows: 2, 10, 40, 100, 200 (local reaction), 300, 600, 800, 1000, 1000, 1000, 1000, 1000 units. Hay-fever symptoms began August 17, and continued with moderate severity during the season. August 26, cutaneous reaction, plum +, cantelope +, celery +, ragweed +, strawberry +, (patient eats strawberries without trouble).

*Case 20.* Miss C. (See 1914, case 4). Treatment (second year), July 6 to September 6, as follows: 8, 15, 40, 100, 200, 400, 600, 800, 1000, 1000, 1000, 1000, 1000 units. Cutaneous reaction to tomato pollen, weakly positive. Patient was practically absolutely free from all hay-fever symptoms during the entire season.

*Case 21.* Mrs. C. B., age 37. Autumnal hay-fever since childhood. Slight asthma during the past two years. Cutaneous reaction ragweed +, pear +, plum +, tomato +, celery —, banana —. Treatment, July 17 to September 13, as follows: 6, 20, 30, 75 (slight local reaction), 150, 300, 600, 900, 1000, 1000, 1000, 1000, 1000, 1000 units. Slight hay-fever symptoms August 24 and throughout the season. Marked improvement. Less cough.

#### TREATMENT WITH CALCIUM CHLORID.

The following cases were treated exclusively with calcium chlorid, except that to a few patients who were having considerable ocular discomfort, a solution of epinephrin 1-10,000, was given for the transient relief which it afforded.

*Case 22.* Mrs. R. W., age 62. Autumnal hay-fever since seven years old. Attacks much less severe of late years than formerly, and apparently growing less each year. Almost no asthma. Of four children, the eldest son has hay-fever and asthma. A sister has vernal hay-fever. Cutaneous reaction ragweed, positive. Treatment, June 11 to September 18,  $\text{CaCl}_2$  1.0 gm. t.i.d. September 11; during past four days some itching of nose, with coryza. Later, patient reports having had very little hay-fever, but thinks it has been about as usual.

*Case 23.* Miss M. T., age 21. Hay-fever since childhood, beginning in May and lasting until cold weather. Sensitive to flowers of all kinds, to dust, wind and smoke. Cannot sweep floors without marked discomfort. No asthma. Eye and nasal symptoms most marked. Has been using epinephrin solutions until they now only aggravate the trouble. July 2, lachrymation, coryza and sneezing of moderate severity, more or less continuously. Ophthalmic and cutaneous reaction ragweed (repeated tests) negative. Calcium chlorid, 1.0 gm. t.i.d. July 9, eyes "wonderfully better." Somewhat less sneezing and coryza. Less sensitive to dust and wind. July 20, much less uncomfortable than usual. On the whole, there is a marked amelioration of symptoms. July 28, very great relief. Is practically free from all symptoms. "I never was so helped by anything before." August 13, patient has no hay-fever symptoms whatever. The relief is absolute. September 6, absolute relief from all hay fever symptoms continues. October 27, has taken no medicine for past six or eight weeks, and has continued to experience absolute relief. Can sweep and dust, encounter smoke and wind without any symptoms of hay-fever.

*Case 24.* A. C. M., age 40. Autumnal hay-fever many years. Two brothers have hay-fever. Ophthalmic reaction ragweed, posi-

tive. Cutaneous reaction ragweed +, pear +, cantelope +, plum —, peach ++, banana —, apple, horse-serum —, strawberry —. Treatment, June 3 to October 1,  $\text{CaCl}_2$ , 1.0 gm. t.i.d. No hay-fever symptoms of note until about September 5, then rather marked coryza and sneezing. Has taken several long railway journeys with only moderate discomfort. During the whole season, considerably less hay-fever than usual.

*Case 25.* L. K. M., age 44 (patient is brother of case 24). Autumnal hay-fever nine years. Two brothers have hay-fever. Asthma. No other known sensitization. Ophthalmic reaction ragweed, positive. Treatment, June 24 to about September 25,  $\text{CaCl}_2$ , 1.0 gm. t.i.d. August 31, some asthma for past few days. During season, hay-fever moderate, possibly somewhat less than usual.

*Case 26.* Miss M. R., age 25. Autumnal hay-fever 7 to 8 years. No asthma. Maternal aunt has had hay-fever since childhood. Ophthalmic and cutaneous reaction ragweed, positive. (I was unable to elicit a positive ophthalmic reaction to ragweed in this patient in 1914). Treatment, June 11 to October 1,  $\text{CaCl}_2$ , 1.0 gm. t.i.d. At first the drug seemed to cause gastric distress so that she could not take it regularly. Smaller doses than 1.0 gm. were necessary, with intermissions, for several weeks but the full dose was taken later. No hay-fever symptoms were experienced until September 5, when there was some sneezing and slight itching in the throat. At the close of the season she reported that she had had little or no hay-fever during the entire time.

*Case 27.* W. R. McI., age 27. Autumnal hay-fever ever since he can remember. No family history. Asthma doubtful. Patient thinks he has some idiopathy against peaches, plums and watermelons, the last named always making him hoarse. (Unfortunately it was impracticable to try the cutaneous test). Treatment, June 30 until some time in September. Patient reports, September 25, "I was much worse than usual."

*Case 28.* J. A. K., age 43. Autumnal hay-fever for 8 to 9 years. Slight asthma. No family history. Cutaneous reaction, ragweed +, peach —, plum —, muskmelon —, watermelon —. Treatment, August 28,  $\text{CaCl}_2$ , 1.0 gm. t.i.d. The patient failed to take the medicine, and reported that he had experienced hay-fever symptoms of only moderate severity during the season.

*Case 29.* Dr. W. A. K., age 40. Autumnal hay-fever 15 years. Slight asthma lately. July 7,  $\text{CaCl}_2$ , 1.0 gm. t.i.d. October 30 the patient reported that he had experienced only the most trifling hay-fever symptoms during the season.

*Case 30.* J. M. B., age 26. Autumnal hay-fever beginning for the first time last year. No family history. Last spring had marked attack of erythema on various parts of the body, which was thought to have been caused by eating strawberries. September 7, cutaneous reaction, ragweed +, apple —, strawberry (fresh fruit) —,  $\text{CaCl}_2$ , 1.0 gm. t.i.d. During the month of September after returning here from immune district, had only moderate hay-fever symptoms.

*Case 31.* D. K. B. (See 1914, case 2). August 30, cutaneous reaction, ragweed +, banana, peach, plum, cantelope, apple, pear, all faintly positive. July 1,  $\text{CaCl}_2$  1.0 gm. t.i.d. Slight hay-fever symptoms began about August 20, and continued, though rather less than usual during the season.

*Case 32.* E. F. H., age 25. Autumnal hay-fever since childhood, usually disappearing about September 10. August 26, cutaneous reaction ragweed +, peach ++, plum ++, muskmelon ++, celery ?, tomato +, strawberry +.  $\text{CaCl}_2$ , 1.0 gm. t.i.d. Reported that during the season he had been slightly better than usual.

*Case 33.* F. P., age 43. Vernal hay-fever usually beginning about June 1 and lasting until end of July. June 12, is having about the usual amount of trouble at this time. Ophthalmic reaction ragweed, negative. Calcium chlorid, 1.0 gm. t.i.d., with almost immediate relief from hay-fever symptoms. Reports August 25, "I have been practically free from symptoms about half the time; the rest of the time, partly free and partly in trouble. About July 28 took a railway journey, traveling all day, weather dry and dusty, with no hay-fever symptoms whatever."

*Case 34.* B. D., age 26. Hay-fever since childhood, beginning in June and lasting all summer, with intervals of partial freedom from symptoms from middle of July to middle of August. August 25, cutaneous reaction, ragweed +, peach —, plum —, celery +, muskmelon + watermelon +, tomato +, strawberry ++. (The patient has no knowledge of any ill effects from eating celery or melons). Calcium chlorid, 1.0 gm. t.i.d. September 7, asthmatic wheezing and troublesome cough about as usual. October 20, during the season hay-fever symptoms were much less than usual.

*Case 35.* Mrs. F. D., age 35. Autumnal hay-fever eight years. Has asthma badly at night, during the whole season. Sensitive to many flowers, also to dust. Strawberries cause pain, so that she does not eat them. Father had asthma. Cutaneous reaction, ragweed +, peach +, plum +, muskmelon +, watermelon —, celery +. Calcium chlorid, 1.0 gm. t.i.d. August 27, some asthma last night. Daughter, J. B., age 4 years, has been having hay fever symp-

toms for the past two or three days, for the first time in her life. (Cutaneous reaction, ragweed, positive, but not strongly, muskmelon negative). September 25, patient reported that she had been, on the whole, rather better than usual.

*Case 36.* Mrs. J. H., age 30. Autumnal hay fever nine years. No asthma. A son, age 6 years, has asthma of unknown origin. July 28, cutaneous and ophthalmic reactions, ragweed, very strongly positive. Calcium chlorid, 1.0 gm., t.i.d. August 3, has been having giant urticaria very badly for past week and has stopped eating fruit. Patient made no subsequent report.

*Case 37.* D. T. (See 1914, case 10), age 28. August 12,  $\text{CaCl}_2$ , 1.0 gm., t.i.d. September 4, has been very comfortable as to hay-fever symptoms. Has been in the country, but suffered very little. Cutaneous reaction, ragweed +, tomato —, pear —, plum, faintly positive, apple —, banana —, strawberry, faintly positive.

*Case 38.* B. R., age 47. Hay-fever, autumnal type since 19 years old. No other known sensitization. Usually suffers most from August 20 to second week in September. August 6, ophthalmic and cutaneous reactions, ragweed +. Calcium chlorid, 1.0 gm., t.i.d. August 25, hay-fever moderately for two days. Cutaneous reaction, peach, faintly positive, pear +, cantelope +, apple +, plum +, banana —. Patient discontinued the calcium for a week in September, taking some proprietary compound from which she thought she had some relief. Then resumed the calcium. On the whole, the hay fever symptoms during the season were of only moderate severity.

*Case 39.* J. A. W., age 24. Autumnal hay-fever 14 years. No other known sensitization. No family history. No asthma. August 23, cutaneous reaction, ragweed, positive. Calcium chlorid, 1.0 gm., t.i.d. September 25, reports that he has had only moderate hay fever symptoms during the season. Has been better than usual.

*Case 40.* Mrs. R. A. J., age 47. Autumnal hay-fever with asthma eight years. About eight years ago, after eating celery, had a marked swelling of the mouth and face, with general itching of the body. A year afterward, had a similar experience. Since then, eating of celery has always produced a rather marked reaction: edema, urticaria and itching of the skin. September 1, cutaneous reaction, ragweed +, banana —, peach —, plum, faintly positive, celery +, pear —, tomato —, apple —, cantelope —. (All reactions more marked after an interval of an hour or two).

September 2, some further cutaneous tests were made as follows:  
I. From the expressed and filtered celery juice, the reaction was

positive. 2. Alcohol in large volume was added to the expressed and filtered juice; the resulting precipitate washed with alcohol, then dissolved in saline solution and filtered. This final filtrate gave a positive reaction. 3. That portion of the alcohol precipitate insoluble in saline, also gave a positive reaction. (It is possible that this precipitate was not washed thoroughly enough to rid it of all traces of the precipitated albumin).

Calcium chlorid was prescribed t.i.d. September 25, reports marked relief from hay-fever symptoms after taking the calcium.

*Case 41.* L. F. M., age 20. Autumnal hay-fever fourteen years. No family history. Asthma marked. Some years ago was sensitive to celery, but is not so now. Has some difficulty with peaches, melons and plums. August 24, cutaneous reaction, ragweed +, watermelon +, muskmelon +, celery +, peach +, plum +. All cutaneous reactions were very marked and definite. Control tests were made with the same substances at this time with Drs. H. V. and W., all being absolutely negative. It is to be noted that the reaction to celery is positive, although the patient states that he is no longer sensitive to this substance, and can eat it without trouble. September 25, patient reports that he did not take the medicine prescribed ( $\text{CaCl}_2$ ), but has suffered from hay-fever during the season, rather less than usual.

*Case 42.* F. W., age 28. Hay-fever beginning in August, for several years. Father has hay-fever. No asthma. Cutaneous, ophthalmic and nasal reactions to ragweed, negative. Cutaneous and nasal reactions to peaches, positive. Calcium chlorid, 2.0 gm. t.i.d. August 25, very comfortable. Has stopped eating peaches. Cutaneous reaction, peaches, negative. During rest of season, very little hay-fever.

*Case 43.* S. S., age 10. Hay-fever symptoms for three years. One attack of asthma three years ago. Mother has urticaria easily. Father thinks patient may be sensitive to melons. August 15, cutaneous and ophthalmic reactions, ragweed, positive. August 25, cutaneous reaction, peach +, plum +, celery +, muskmelon +, watermelon +, banana +. Calcium chlorid, 1.0 gm. t.i.d. Patient was fairly comfortable until early in September, when he left the city.

*Case 44.* C. S., age 25. Hay-fever for nine years, beginning in early spring and lasting until second week in October. Asthma. Symptoms marked. June 30, hay-fever symptoms distressing. Ophthalmic and cutaneous reactions to ragweed, negative. Calcium chlorid, 1.0 gm. t.i.d. Patient reported September 25. The hay-fever symptoms, which were severe, disappeared after the second

dose of the medicine, whereupon she promptly stopped taking it regularly. Afterward, took a long auto trip, without any symptoms. During the summer had occasional slight symptoms only, which disappeared promptly on taking one or two doses of the calcium. Has been practically free from all symptoms of hay-fever ever since beginning to take the drug. Thinks the results are "wonderful." She would probably have taken the calcium more regularly if it had not seemed to increase the secretion of urine and the necessary frequency of urination so much as to make her uncomfortable.

A number of other patients were seen and prescribed for, but failed to make any report.

#### THE RESULTS OF TREATMENT.

During the year 1914, sixteen patients were treated by means of injections of pollen solution. A few injections of mixed ragweed and goldenrod pollen were given, but ragweed pollen alone was used in most cases. Of this number, five discontinued treatment. The data for the eleven other patients are given in the following table:

Table I. Pollen Solution Injections, 1914.

Case No.	Number of Injections	Maximum No. Units Given	Duration Treatment	Results.
1	8	300	July 25—Sept. 10	+
2	20	1000	July 28—Sept. 19	+
3	5	200	Aug. 3—Aug. 17	—
4	20	800	July 28—Sept. 14	++
5	13	300	July 30—Aug. 28	+
6	18	800	July 30—Sept. 9	+
7	12	500	Aug. 3—Sept. 4	+
8	14	1000	Aug. 5—Sept. 4	++
9	8	500	Aug. 14—Sept. 4	0
10	7	400	Aug. 27—Sept. 16	+
11	6	400	Sept. 3—Sept. 30	0

*Note.* In this, and in the following tables, the signs used to record the results of treatment, have the following signification:

- Hay-fever symptoms worse than usual.
- 0 Hay-fever symptoms about as usual.
- ⊕ Hay-fever symptoms moderately relieved. Less than usual.
- ++ Marked relief from hay-fever symptoms. Very much better than usual.
- +++ Either absolute freedom from hay-fever symptoms, or has only the most insignificant ones.

During the year 1915, the data on ten cases are as follows:

Table II. Treatment by Injection of Pollen Solutions, 1915.

Case No.	Number of Injections	Maximum No. Units Given	Duration Treatment	Results
12	18	1000	June 8—Aug. 25	+
13	21	1000	June 8—Sept. 6	+
14	18	1000	June 8—Aug. 24	0
15	20	1000	June 9—Aug. 24	+
16	16	1000	June 10—Sept. 4	—
17	16	1000	June 2—Sept. 11	+
18	15	1000	June 14—Sept. 11	+
19	13	1000	July 3—Aug. 28	+
20	14	1000	July 6—Sept. 6	+++
21	16	1000	July 17—Sept. 13	++

*The treatment with calcium chlorid.* Twenty-two patients were treated wholly or in part with calcium chlorid. The results and other data are given in table 3.

#### SUMMARY OF RESULTS.

In estimating the results secured by any method of treating hay-fever, we must remember the characteristic variability in the severity of symptoms which is so essentially and naturally a part of the picture of the disease. The symptoms in all pollen cases are, for one thing, in a direct ratio to the amount of the sensitizing pollen with which the patient is brought in contact. They are thus modified by weather conditions and local surroundings. It is also true that in a given individual there are seasonal differences in their intensity. What is true in pollen cases is undoubtedly true also in other forms of sensitization. For these reasons, the temporary cessation of symptoms, or slight differences in their severity must be considered as a part of the natural history of the disease. I believe it is fair to consider as modified by treatment, only those cases showing continued marked improvement, or at least a high average betterment, and those showing absolute, or nearly absolute, freedom from all symptoms. It is probable, or even certain, that this criterion rigidly applied, will exclude many cases which have really received benefit from treatment; but at least until our experience is more ample; it will be better to err in this direction.

Of the eleven patients treated in 1914 with pollen solutions, none were absolutely relieved, and only two could be said to have shown "marked improvement."

Of the ten patients treated with pollen solutions in 1915, one (her second year of treatment), had absolute relief, and one, marked improvement.

Table III. Treatment With Calcium Chlorid.

Case No.	Type of H.F.	Duration of Treatment	Amt' CaCl pro. die.	Result	Remarks.
22	A	Jun. 11—Sept. 18	3.0 gm.	0	Immediate improvement and absolute freedom from all symptoms after July 28.
23	V.A.	Jul. 2—Oct. 1	"	+++	Multiple sensitization.
24	A	Jun. 11—Sept. 25	"	+++	No symptoms until Sept. 25, then itching in throat with sneezing. No trouble afterward. Dose had to be omitted at times.
25	A	Jun. 21—Sept. 26	"	+++	
26	A	Jun. 11—Oct. 1	"	+++	
27	A	Jun. 30—Sept. 22	"	—	Sept. 25, patient writes, "I was worse than usual."
28	A	Aug. 28—	"	+	Patient did not take the medicine.
29	A	Jul. 27—Oct. 1	"	+++	Only insignificant symptoms.
30	A	Sept. 7—Sept. 24	"	+++	
31	A	Jul. 10—Sept. 25	"	++	Multiple sensitization, faint.
32	A	Aug. 26—Sept. 25	"	++	Multiple sensitization.
33	V	Jun. 12—Aug. 1	"	++	Immediate relief, and practical freedom from all symptoms about half the time.
34	V.A.	Aug. 25—Oct. 1	"	+	Multiple sensitization, moderately marked relief during season.
35	A	Aug. 30—Sept. 25	"	+	Multiple sensitization.
36	A	Jul. 28—	"	+	No report.
37	A	Aug. 17—Sept. 20	"	++	Was in the country most of the time. Very little hay-fever.
38	A	Aug. 10—Sept. 7	"	++	Multiple sensitization.
39	A	Aug. 23—Sept. 22	"	++	
40	A	Sept. 2—Oct. 1	"	++	Multiple sensitization.
41	A	Aug. 24—Sept. 22	"	++	Did not take drug regularly.
42	A	Aug. 16—Sept. 22	6.0 gm.	++	Raweed reaction negative. Peach, positive. Stopped eating peaches.
43	A	Aug. 15—Sept. ....	"	++	Multiple sensitization. Left city.
44	V.A.	Jun. 30—Oct. ....	"	++	Multiple sensitization. Took drug irregularly. Relief immediate and complete. Ragweed reaction negative.

Of the four patients who were under treatment with pollen solutions and who received calcium chlorid as soon as their hay-fever symptoms developed, none were definitely benefited, even though they all reported themselves as being more comfortable than usual.

I am aware that as to pollen de-sensitization, these results do not appear to be as brilliant as those reported by other writers. Freeman reports 84 cases, of which 30.1 per cent were nearly or quite absolutely free from symptoms, and 34.5 per cent were greatly improved. Cooke reports 60 cases of vernal hay-fever with marked improvement in 60.5 per cent, and 80 cases of autumnal hay-fever with 25 per cent having marked improvement. Ulrich reports satisfactory results in about 60 per cent. Lowdermilk reports more than 70 per cent cured. Kœssler reports 41 patients, of whom 10 per cent were completely relieved, and 75 per cent markedly benefited. Oppenheimer and Gottlieb report on eleven cases with 45 per cent cured. Goodale reports on 79 cases, and is content with saying that about 25 per cent seemed to have received marked benefit from treatment.

In every case reported in this paper, either the ophthalmic or the cutaneous test, or both, was tried, and no patient was treated with ragweed solution who was not previously shown to be definitely ragweed sensitized. Further, all the pollen solutions were made by myself, so that their strength, quality and freshness were directly known.

To explain why the results I have obtained were less favorable than those of other observers, I am inclined to say that in part, this may be due to the fact that, for reasons already mentioned, I am unable to accept anything short of marked relief from hay-fever symptoms as definitely due to treatment, and even this degree of improvement, if it is more or less transitory, may arise from other causes.

Given a patient sensitized to ragweed only, his de-sensitization by means of ragweed pollen solutions appears to be a perfectly logical possibility; but from the fact that multiple sensitization can be shown to exist in so large a proportion of hay-fever subjects, the attempt to de-sensitize by means of the administration of any one sensitizing substance alone, would seem foredoomed to failure. I believe this fact may account for some of the failures in the treatment by means of pollen solutions.

*The Cutaneous Test.* The so-called cutaneous reaction was devised in Blackley<sup>10</sup> in his experiments on the action of pollen, together with the ophthalmic and nasal tests. During the past sum-

Table IV. Cutaneous Tests.

Case No.	Rag-weed	Pear	Bach	Water melon	Musk melon	Banana	Apple	Celery	Tomato	Strawberry	Plum	Sore serum
12	+	-				-			-			-
13	+	+	+		+	+	+		+			+
14	+	+	-		+	-						+
17	+	-				-	-			±	-	
18	+	-	-		-	-	±					-
19	+				+				+		-	+
21	+	+				-		-	+			+
24	+	+	±		+	-	-				-	+
25	+		-	-	-	-	-					-
26	-								-		-	±
27	+		-	-	-							-
30	+						-				-	-
31	+	±	±		±	±	±					
32	+	±	±		±			±	+	+	+	±
34	+	-	-	+	+			+	+		±	-
35	+	+	+	-	+			+				+
45	+											
37	+	-				-	-		-	±	±	
38	+	+			+	-	+					+
40	+	-				-	-					±
41	+		+	+	+			+				+
42	-											
43	+		+	+	+	+		+				+
44	-	-	-	-	-	-	-					-
V.	-	-	-	-	-	-	-					-
W.	-	-	-	-	-	-	-					-
J.	-	-	-	-	-	-	-					-
M.	-	-	-	-	-	-	-					-

mer I have tried the cutaneous test in 22 hay-fever subjects and many normal persons, with a variety of substances other than pollen. All scarifications of the skin for the test were made under a magnifier with a needle point, in order to get them as nearly uniform as possible. Only the superficial and non-vascular layers of the skin were removed, so that commonly, no blood appeared in the abrasion. The results of these tests are shown in the following table.

The cutaneous test was made in these cases on the patient's forearm, although in persons prone to pigmentation of the skin it may better be made on some less conspicuous part. A sufficient number of minute abrasions made as above described, including one always for a control, a bit of the fresh fruit, pollen solution or a drop of

serum was either gently rubbed on the abrasion, or placed in contact with it for a few minutes; generally one to three minutes being sufficient time. The skin was then cleansed with a bit of moistened gauze, care being taken not to get a multiple inoculation at any spot. The control abrasion always showed a slight elevation of the skin immediately around it, and a small surrounding zone of hyperemia. The reaction was considered positive if there was a definite edema or wheal at the site of the inoculation. Where this edema, although measurably greater than that at the control abrasion, was nevertheless slight and rather transitory, the reaction was noted as +. A positive reaction was always accompanied by more or less marked hyperemia of the skin surrounding the inoculation, varying in degree with the intensity of the reaction. Other symptoms, such as smarting, burning and particularly itching, were frequently present. The reaction usually appeared in from three to five minutes, and lasted from half an hour to two or three hours.

Figure 1 shows the shape and relative size of the reactions occurring in case 41. In connection with the accompanying hyperemia, the picture was a rather striking one.

The materials chosen for these tests were chosen at random. If we will consider how extremely probable it is that a sensitized subject, such as case 41, would show a positive reaction against many other substances, the imperfect and partial character of the tests enumerated above will be better appreciated, and the enormous practical difficulties that may be encountered in attempts at specific de-sensitization. Not a few persons have been shown to be sensitized to such common articles of food as milk, butter, oatmeal, buckwheat; and if we add to these drugs, pollens, and protein substances generally, the list may be nearly endless (see Goodale, reference 6).

It is not my purpose at this time to discuss the cutaneous test at greater length, and the experiments which have been given are here introduced for the purpose of suggesting some of the difficulties which may lie in the way of the treatment of hay-fever by specific de-sensitization, whether by means of pollen solutions, or any other special sensitizing substances. It is possible, too, as already suggested, multiple sensitization may account for many failures in treatment with pollen solutions.

As far as my observations extend, although the number of observed cases is not large, the results of the treatment with calcium chlorid have been more satisfactory than those of treatment with pollen solutions. It must be noted also that none of the patients have taken the drug for that extended length of time which Em-

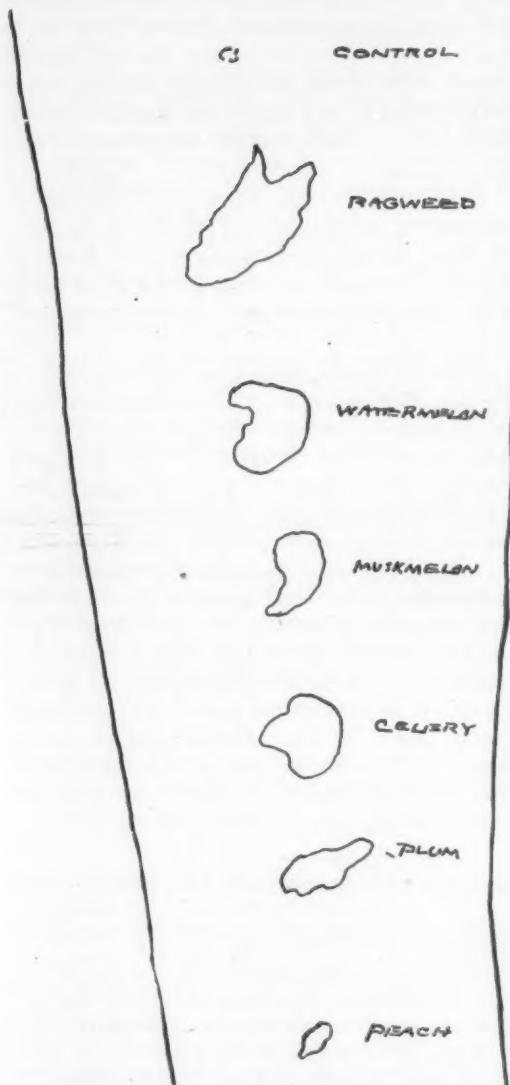


Figure 1. Skin Reactions in Case 41.

merich and Loew recommended. Although it has been shown that the maximum retention of calcium in the body occurs only after its prolonged ingestion, it may be found that its optimum effect may be secured with a less prolonged taking of the drug than has been advised. This may vary with individuals. Case 44 appeared to get almost immediate relief from 1.0 to 2.0 gms., and absolute immunity was brought about in case 26 within less than a month after beginning treatment.

There seem to be no definite contra-indications to the daily ingestion of 3.0 to 6.0 gms. of calcium chlorid. Anyone taking one or two pints of milk daily, will get as much calcium. If there is a tendency to constipation, it is easily remedied, while gastric distress may be overcome by a reduction in, or temporary discontinuance of, the drug.

*Conclusions.* 1. The de-sensitization of hay-fever patients by means of specific pollen solutions will materially relieve a small percentage of them if treatment is begun early enough. 2. Pollen solutions for therapeutic use should be prepared and used with great care and understanding. When improperly prepared or used, there is danger of serious, if not fatal, reactions. 3. Multiple sensitization is a frequent phenomenon in hay fever subjects, and its existence may account for many failures in the treatment by means of pollen solutions. 4. The treatment of hay fever by means of calcium salts rests largely on empirical observations, but from the limited data at hand, if the doses are sufficiently large, and prolonged through a more or less extended time, a large percentage of patients will receive material benefit. It is possible that vernal cases yield more readily than autumnal cases. 5. The administration of calcium salts is without danger to the patient and may be undertaken by any intelligent physician. It requires neither a careful laboratory technique, nor any special knowledge for its employment.

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**Tuberculosis of the Superior Maxilla.** RAFFAELE D'ALISE, *Annali di Odontologia*, Feb., 1916.

The author reports two cases which gave him the opportunity of carrying out some experimental studies. He states that primary tuberculosis of the oral cavity and especially of the upper jaw is rare. As regards the etiology and pathogenesis of tuberculosis of the jaws, he believes that dental decay and wounds resulting from teeth extractions open the way for the direct penetration of the tubercle bacillus, or the decay diminishes the resistance of the tissue and facilitates the localization of the tubercle bacillus in predisposed subjects.

P. F.

## **STREPTOCOCCUS MUCOSUS CAPSULATUS INFECTION OF THE MASTOID BONE.\***

DR. ROBERT L. LOUGHREN, New York.

Of the various pathogenic organisms with which we have had to contend within the past few years as producing purulent infections of the middle ear and mastoid process, the streptococcus mucosus capsulatus has come to be the one that most arouses our interest for several reasons, not only on account of its tendency in many cases of producing a very rapid general involvement of the entire bony structure of the mastoid, but also because of its tendency in other cases for, as Whiting has described it, the development "of a most dangerous and insidious latent period which may justly occasion apprehension concerning the outcome of any inflammatory ear disease which has its origin in the activities of this infective agent."

Experience has taught us that it is an infective organism powerful in its ability to produce extensive destruction of bone tissue, and rapid in its action as well, but chiefly that its effectiveness may not be confined, as in many others of the bacteria producing bone necrosis, to those acute stages of the disease which we hope to relieve by a complete removal of all effected areas. Its effects, while active during the acute stages, may lie dormant during even an extended period in which the physiological process of repair is going on, and at some stage when we are secure in the feeling that all possibility of complication has passed, startle us with the realization that our judgment of security was unfounded, by the sudden bursting into action of an exacerbation which we are unable to combat.

The organism was first referred to by Howard and Perkins in 1901, in a paper entitled "The Streptococcus Mucosus Pathogenic for Man and Animals." They made cultures from the peritoneum and other organs of a woman who had died of suppurative peritonitis and demonstrated a coccus arranged in chains of varying numbers and surrounded by a thick capsule which, though similar to the pneumococcus in many ways, did not have the typical lancet shape of the pneumococcus. They described a characteristic appearance of the infected area acted upon by the organism they had

\*Read before the Otological Section, New York Academy of Medicine, January 14, 1916.

isolated. The surface of the intestine was covered with a thin layer of opaque, grayish-white viscid exudate, and a considerable amount of creamy pus filled the abdominal cavity. The mucous membrane of the various organs was completely destroyed, the entire walls being infiltrated.

Later, in 1903, the organism was more carefully studied by Schotmuller who separated it from the pneumococcus in the class of the encapsulated cocci and gave it a distinct name, laying stress upon its characteristic of producing a tenacious mucoid exudate upon any surface upon which it became active.

That it is a bacterium closely associated with the pneumococcus is the opinion held by many writers, yet having sufficient characteristics individual to itself in its growth in various media, its reaction in immunological and fixation experiments and its pathological reaction in diseased tissues, to entitle it to especial attention. They all admit that much work still remains to be done to place it in the position of knowledge to which its virulence entitles it.

Buerger, in a discussion of the morphology of the encapsulated cocci, has divided the pneumococci into four groups. (1) Typical forms. \*(2) Small forms. (3) Large forms. (4) Bacillary forms; describing the third group as having especially wide capsules, and stating that "such diplococci may easily be mistaken for the streptococcus mucosus capsulatus but are, as a rule, very definitely lancet shaped, whereas, the latter are possessed of a more rounded or biscuit shaped form." In referring to the morphology of the streptococci he states that "many reported instances of the occurrence of encapsulated streptococci have added to the confusion which already existed in our views of the relationship of the pneumococcus and the streptococcus." His classification of the streptococci divided them into (A) 1—Streptococci without capsules, 2—Streptococci with capsules; (B) Streptococcus with mucoid capsules which he describes as the streptococcus mucosus capsulatus. "They appear in exudates and blood as round, biscuit or rarely almost lancet shaped diplococci, surrounded by a wide, mucoid, diffusely staining and definitely limited capsule, appearing in chains of five or six elements. The diplococcus forms may be mistaken for pneumococci. But the mucoid streptococcus is not lanceolate, its capsule elements are larger and short chains are usually to be found, and instead of the constriction between the diplococci as seen in the case of the pneumococcus, the capsule

is an elongated mass of mucoid substance with no indentation on the outer surface of the envelope."

On the other hand, Hanes, in a paper on "An Immunological Study of the Pneumococcus Mucosus" sums up his conclusion under five heads. (1) That the organism described by Schotmuller, under the name of streptococcus mucosus and characterized by the power of producing a tenacious, mucoid exudate in the peritoneal cavity of white mice, represents a well defined group with characteristics which indicate a close relationship to the pneumococci rather than to the streptococci. (2) That the members of the group (the pneumococcus mucosus) are especially agglutinable when treated according to the method of Porges. They do not agglutinate when subjected to the usual agglutination methods. (3) That complement fixation experiments with these organisms compared with similar experiments with pneumococci and streptococci indicate that they are closely related to the pneumococci. (4) That no protection of mice against pneumococcus mucosus by means of specific immune sera could be demonstrated. And he finally concludes by declaring that the name "pneumococcus mucosus" should be adopted for this group instead of the streptococcus mucosus. He further notes that in his series of cases of lobar pneumonia caused by the pneumococcus mucosus, sixty-six per cent had been fatal and that when the organism had been found in the blood, all had died.

Again Lyall concludes that the type reactions for the pneumococcus mucosus group are the same as for the true pneumococci, and it is interesting to note that the majority of the strains he studied, (ten in all) were isolated from cases of acute mastoiditis.

Dochez and Avery, writing on the "Varieties of Pneumococcus and their Relation to Lobar Pneumonia," present tables showing the relative occurrence of organisms of the different types during the year 1912-1913 and recording the fact that in thirteen per cent of their cases the organism fell in the group classified as the pneumococcus mucosus, and that in 1913-1914, eight per cent were of the mucosus group.

All of which indicate to us the uncertainty that exists in the minds of the bacteriologists of just where the organism that has grown to give us so much concern should be placed in the classification of the bacteria, but of its virulence and its insidious tendency for the production of late complications, we can have no doubt and, for the purpose of recording the various symptoms and con-

ditions which the streptococcus mucosus capsulatus may produce, the following cases are offered:

Case 1.—Mrs. S. J., thirty-five years of age, seen in consultation with Dr. Little on March 13, 1910, upon arrival from the South, had been attacked with what was considered to be a case of grippe with an acute coryza and tonsilitis. Two days following the onset of the grippe and fifty-two hours previous to my examination, she had been aroused from sound sleep by sharp pain in the right ear. This had persisted, the constitutional symptoms associated with the grippe had increased, and the temperature had ranged from 101 degrees to 103 degrees. Otoscopic examination demonstrated an acute exudative otitis media, associated with the cardinal symptoms of an acute mastoiditis, with pronounced prolapse of the posterior canal wall and exquisite tenderness over the entire mastoid area. The drum was incised and a moderate amount of thin, purulent fluid evacuated. Microscopical examination of a smear showed the presence of the streptococcus mucosus capsulatus in large numbers, and a simple mastoid operation was performed. The structure of the mastoid had apparently been one of large pneumatic cells but these had been completely destroyed and the completion of the operation showed an extensive cavity extending well up into the zygomatic process, and back over the sigmoid sinus into the occipital bone. The mastoid tip had been entirely removed. An interesting point in connection with the case, besides the extent of involvement, was an extensive destruction of skin and cellular tissue of the scalp composing the posterior margin of the wound which began within twenty-four hours following the operation and which was not under control for at least a week. During this time the patient showed marked evidence of general absorption with a septic temperature ranging as high as 103.6 degrees and pronounced prostration. Another point of interest which was also credited to the virulence of the infection was the prolonged duration of the healing process. Granulation tissue was slow of production and the wound was not completely cicatrized for thirteen weeks and then with a deep depression extending from the location of the tip well up into the cavity made in the zygomatic root. This failure of development of granulation tissue framework was credited to constant reinfection from the constantly active pathogenic organism. The patient finally made a complete recovery and has since been perfectly well.

Case 2.—Mrs. H. R., age twenty-six, when first seen in consultation April 14, 1910, had been suffering for a week with an acute

exudative otitis media and diffuse furunculosis with oedema extending well out over the mastoid bone. Symptoms of a possible complicating mastoiditis were thoroughly masked by those of the furunculosis, and it was only after a bacteriological examination of the pus from the middle ear had demonstrated the presence of the streptococcus mucosus capsulatus, that it was thought justifiable to consider the mastoid as also involved. An operation demonstrated the fact of a very extensive involvement with pronounced exposure of the dura and lateral sinus. The patient reacted satisfactorily following the operation, the wound progressed favorably and she was allowed to go home in two weeks, the second of May. At first, following the institution of every other day dressing in the office, the wound continued to improve, but later began to lag somewhat in the healing process, the granulations becoming flabby and pale with a tendency to break down and the surface became bathed in a more or less tenacious mucoid material, but her general physical condition remained excellent. On June 9, she became suddenly ill with a pronounced chill and, after the temperature chart had shown a rise to 105 degrees with a remission to 99 degrees on two successive days, a diagnosis of lateral sinus thrombosis was made and an operation immediately performed. Upon opening the sinus a well organized clot was found filling its entire lumen. The upper portion was picked out with a forceps and was followed by a pronounced gush of blood easily controlled by pressure. With the removal of the lower portion by forceps, a second gush followed which was easily controlled. From the fact that the clot had been removed apparently in toto, and feeling that the profuse extravasation of blood had washed out any remains of clot, it was determined not to excise the jugular vein. The patient ran a septic temperature for about a week when an abscess appeared in the forearm which was incised and drained. Following this, the patient reacted promptly and made a good recovery at the end of eight weeks, and has since been perfectly well having gained, in five years, about forty pounds in weight. This was a case of mucosus infection, rapid in its onset, with an extensive involvement of the mastoid and with the development of what Whiting has described as "the insidious latent period" which, while acting mildly in the granulation wound, was burrowing deeply without apparent symptoms until it bloomed forth as well developed sinus thrombosis.

Dr. McKernon has reported a case similar in post-operative history which the writer was privileged to study, on which a mas-

toid operation was performed following a streptococcus mucosus infection in which the wound was entirely healed and the patient going about when he developed acute symptoms of a cerebral complication, rapidly lapsed into coma and died. Operation demonstrated an extensive purulent meningitis which had begun at the site of a large dural exposure.

*Case 3* was first seen on December 25, 1914, a boy of ten years who had complained for three days previously of some acute intestinal disturbance which was relieved by a cathartic. At the same time he had a pronounced general headache which for twenty-four hours had been improved. On the day previous to my seeing him he had complained of a severe pain in the right ear which had lasted for only a few hours and had been relieved by hot applications. Otoscopic examination demonstrated the presence of an acute exudative otitis media, but without excessive pressure against the drum. The drum was incised and a small amount of secretion, mucoid in character, was evacuated. Bacteriological examination of this secretion showed the presence of the streptococcus capsulatus. At the time of the myringotomy the temperature was 104 degrees, and in the evening it was 101 degrees. For two days following\*he continued to show only the presence of the symptoms of a suppurative otitis media, with, at first, a scanty mucoid discharge, which later became thick and creamy, though not profuse, and the temperature ranged between 101 degrees and 103.6 degrees. But the headache of which he had first complained persisted. On the third day he had for the first time, a point of periostial tenderness over the mastoid antrum, but what was of far more importance, he began to show some evidence of cerebro-spinal irritation, with rigidity of the muscles of the neck, and increased general headache. He was operated upon without further delay. No free pus was found but the mastoid cells were found to be filled with serum and granulation tissue, especially at the tip. The sinus was apparently normal and a fairly extensive exposure of the dura demonstrated no lesion in that portion at least. The patient died five days later with all the symptoms of an acute meningitis. A lumbar puncture, done at the time of the operation, evacuated a cloudy cerebro-spinal fluid under pressure, and a cover glass smear showed the presence of the streptococcus capsulatus mucosus in large numbers.

Lack of time prevents the citing of other cases, two showing the extent and rapidity of involvement of the mastoid bone, neither

one showing sufficiently pronounced diagnostic signs for immediate operation other than the presence of an organism whose virulence we have come to recognize, and two in which, the organism was demonstrated in the beginning, drainage through the middle ear and additus was such as to take care of the products of destruction in the mastoid and the abscess cavity drained itself out without operative interference.

So that, in meeting a streptococcus mucosus capsulatus infection, experience has, I think, taught us that we are dealing with an organism whose power of rapid and extensive destruction of the mastoid bone may easily be able to combat our best efforts against it and that, in order to conserve our patients' best interest, we must, by early and frequent bacteriological examination of all discharges in a suppurative otitis media, be in a position to take advantage of every point that could be of value in determining the necessity for operative procedure, and further, that having made an attempt to stop its destructive course by operation as soon as there is any indication of mastoid involvement, we still have an uncertainty of prognosis to consider until even after the wound is healed and the patient apparently well.

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**Indications for Blood Transfusion.** ARTHUR KRIDA, *Albany Med. Ann.*, April, 1916.

The indications are (1) in massive hemorrhage; (2) marked secondary anemias either as a palliative or as a pre-operative measure; (3) essential anemias; (4) hemophilia, purpura and other blood dyscrasias; (5) some acute infections. No blood transfusion should be undertaken without first making agglutination or hemolysis tests of the patient's and donor's blood.

P. F.

## CATARRHAL DEAFNESS, WITH SUGGESTIONS AS TO TREATMENT.

DR. W. EUGENE DIXON, Oklahoma City, Okla.

Dr. Woods Hutchinson says that "for every attack of illness, for every crippling of working power, for every early breakdown, for every premature death, there is a definite, tangible cause, a cause that is visible to the naked eye or the microscope, that can be found nine times out of ten if looked for, and can be destroyed or checked in its further course, not merely at one, but usually in three or four different stages in its career—at all stages, in fact, save the last." How true this is when applied to catarrhal deafness; and yet we, as otologists, must admit that there are hundreds, yes, thousands of people, both old and young, who are gradually and insidiously becoming deaf; whose usefulness, earning power and efficiency are lessened just in proportion as the hearing grows worse, and, saddest of all, whose mental activities become weakened or diminished owing to the elimination of the sound of the human voice. Preventive medicine is the watchword of to-day. Internal medicine perhaps holds first place here. To it due credit must be given for vaccination, serums and bacterins. The surgeon and ophthalmologist have done their part, but what have we as otologists done in the way of preventing or curing catarrhal deafness? It is true that as surgeons we have invaded every nook of the temporal bone, and we are proud of our achievements, but is it not possible that we have sacrificed the comfort and health of the many to help the few?—for there are a hundred cases of gradual, insidious deafness, growing worse year by year, to one surgical case. It is true that methods of relief for this class have proven most unsatisfactory. This is perhaps why we as aurists do not pack our samples and take them to the county and state medical societies and there extol their virtues in an effort to sell our goods.

*Pathology.* We are here interested only in that form of catarrhal deafness caused by an infection in the membrane lining the middle-ear chamber, with round cell infiltration and thickening, and the subsequent formation of fibrous tissue. The process is usually associated with an acute or chronic infection of the naso-pharynx and, of course, is subject to acute exacerbations from time to time. It is at these times that secretions can be detected in the tympanum

—not by inspection through the drum membrane, for this is too opaque usually from chronic thickening, but by the inflation of the tube.

The tube in these cases may or may not be permanently occluded. When the tubal occlusion has been a factor we will always find the drum membrane opaque, thickened and retracted. On the other hand, where tubal occlusion has not been a persisting factor the drum membrane may be a very little retracted, but is usually opaque and thickened. It is in these cases that our diagnostic skill is put to the test. The membrana tympani is opaque, so at least there must be an infection of the mucous membrane within the tympanum. The tube is open, so the deafness must be caused by an obstruction in the conducting mechanism in the tympanum; but is there a fixation of the stapes or otosclerosis, or is the deafness dependent on the existence of adhesive bands in the tympanum?

The most pronounced disturbance in hearing no doubt is caused by the fixation of the stapes, but it is absolutely impossible to make an exact diagnosis when the oval window is affected by spongification and the middle-ear is diseased at the same time. The labyrinth defect, due to secondary degenerative changes of the cochlea can best be detected by noting the loss of hearing for the higher notes of the Galton whistle.

Inflammatory adhesion bands in the tympanum play an important role in the deafness of those suffering from chronic non-purulent otitis media. These thickened adhesive bands in the tympanum are often formed out of the folds of mucous membrane connecting the ossicles with the walls of the tympanum. These folds vary a great deal in different persons, being developed much more in some than in others. The difference in the development of these folds of mucous membrane in the tympanum explains perhaps why one person with oft-repeated attacks of mild middle-ear inflammation develops a pronounced and serious deafness, while another with a similar process may suffer only a slight defect in hearing.

Chronic non-purulent otitis media, so far as we know, is an infection, inflammation or disease of the mucous membrane of the middle-ear, and about 90 per cent of the diseases of the middle-ear begin in the Eustachian tube. Again, the Eustachian tube is important to us as otologists, as it is via the Eustachian tube that we try to relieve those suffering from middle-ear deafness. Let us pause and study the histology of the mucous membrane of the middle-ear, as well as the anatomy of the Eustachian tube, for in no other part of the body is a more precise knowledge of the anat-

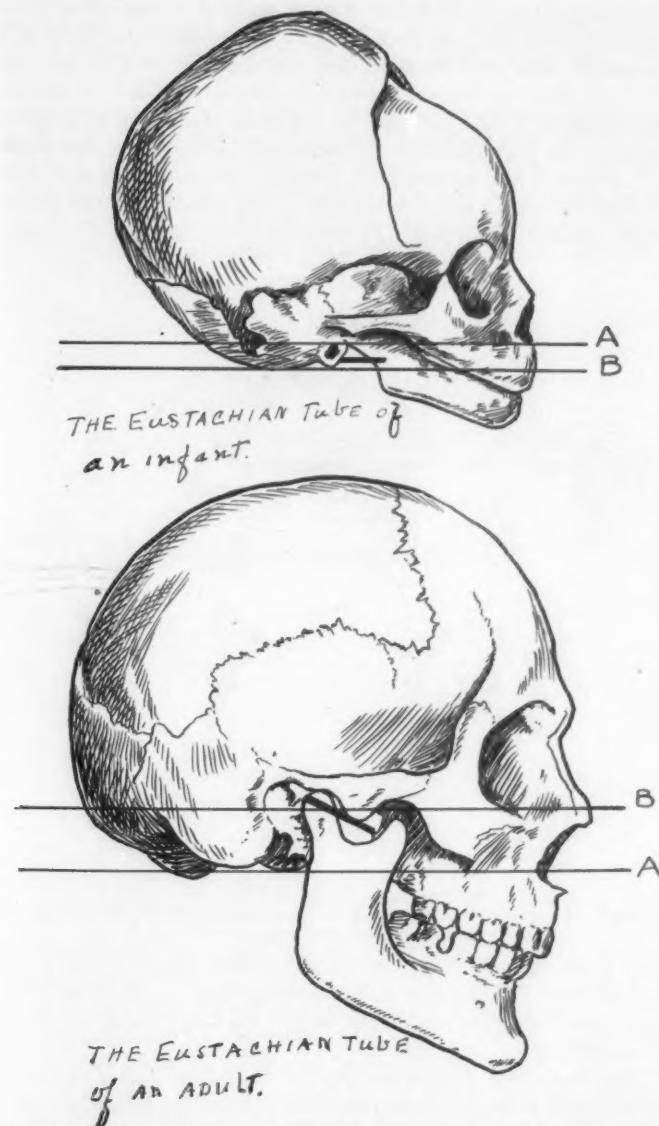


Figure 1. Showing relative positions of Eustachian tube in the infant and adult.

omy required in its treatment than is required in our present-day methods of treating catarrhal deafness; for to-day it is not enough to merely blow out the tubes and massage the ossicles, but the otologist must be competent and prepared to treat any portion of the Eustachian tube by applying medicine, electricity or surgery direct to the part affected. Furthermore, the author of this paper will present a new technique for passing a cotton-wound applicator through the nostril and into the tube without the use of the Eustachian catheter as a guide. To understand this technique we must

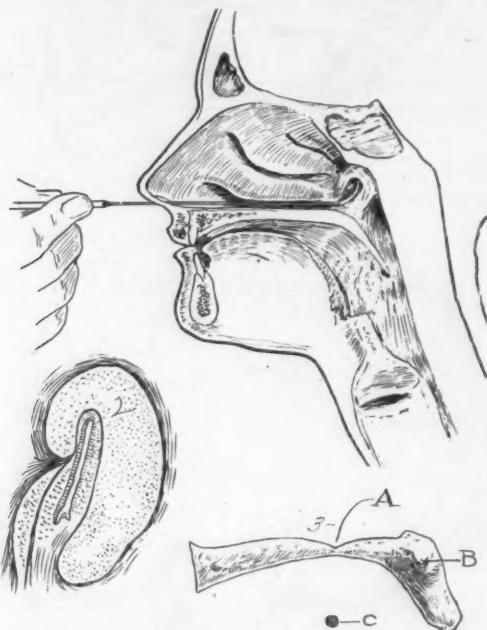


Fig. 2. 1.—Applicator introduced; 2—Pharyngeal end of tube; 3—Cast of tube, tympanum and external auditory canal.

have a clear picture in our minds of the size, shape, direction and various angles of the tube itself; besides, it is necessary to know the exact position of its mouth within the naso-pharynx, as well as its opening in the tympanum.

*Anatomy.* The Eustachian tube is a canal extending from the lateral wall of the naso-pharynx in an upward, backward and outward direction to the anterior part of the tympanum, into which it opens about 7 mm. above the floor. It varies in length in different

individuals. In some it is only 34 mm., in others as long as 44 mm., but usually it is about 36 or 37 mm., or about 1½ inches. It is partly bony and partly cartilaginous. The bony portion, or upper one-third, is called the tympanic portion and is about one-half inch in length. The remainder of the tube is cartilaginous and is about one inch in length. The tube has somewhat the shape of an hour glass, being wider at the ends and narrowed at the junction of the cartilaginous and bony portion into the isthmus, where its height is about 3 mm. and its breadth about 1½ mm. It forms an angle of

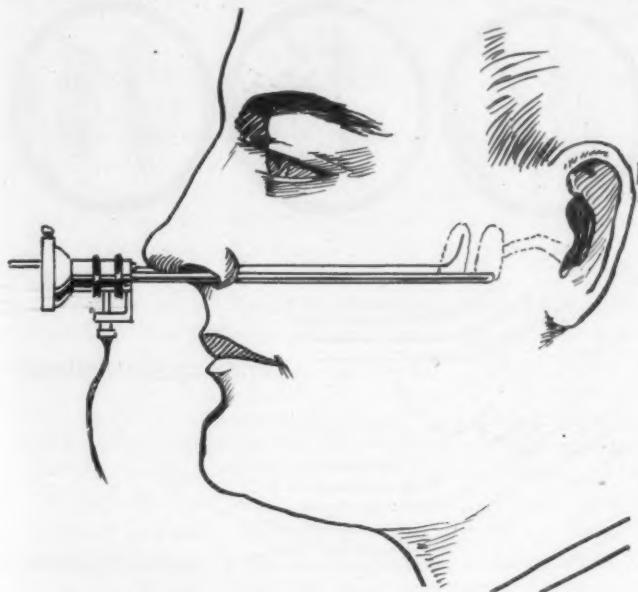


Fig. 3. To illustrate method of treatment.

45 degrees with the sagittal plane, one of about 33 degrees with the horizontal plane, and an angle of from 135 to 145 degrees with the long axis of the external auditory canal, opening outward. The cartilaginous and bony portions of the tube do not lie exactly in the same plane, but join at a very obtuse angle, opening downward. The pharyngeal opening is about 15 mm. lower than the tympanic opening in the adult, but in the infant the tube is very short, about 14 mm., contains no isthmus, and both ends of the tube are in the same horizontal plane.

While the pharyngeal portion is known as the cartilaginous division, it is well in treating this part of the tube to remember that only its posterior wall, root and upper part of the anterior wall are really cartilaginous. The remainder of the tube is made up of fibrous tissue. Its posterior or median wall is formed by a plate of fibro-cartilage, which projects vertically upon the lateral wall of the naso-pharynx. The projection or ridge forms the posterior wall of the pharyngeal mouth of the tube and the anterior wall of the fossa of Rosenmuller. The upper margin of the cartilage of the

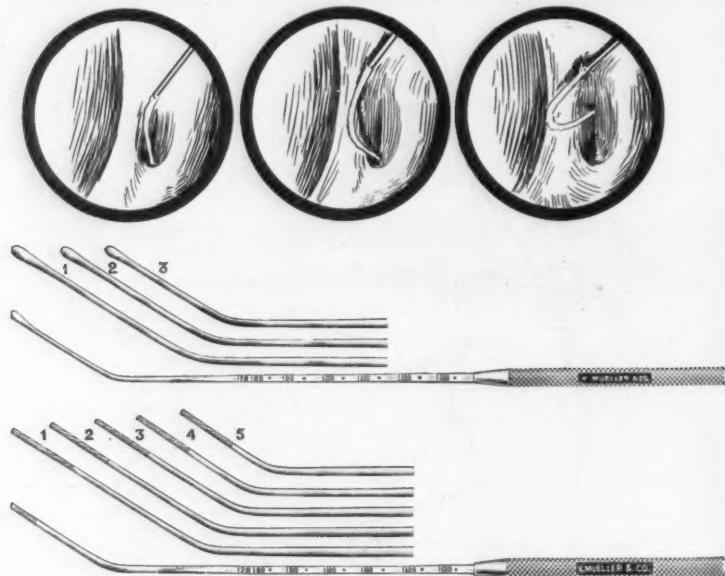


Figure 4. Eustachian applicators.

posterior wall curls forward and downward and is continuous with the roof and cartilaginous plate of the anterior wall. This anterior plate of cartilage is narrow and forms only about one-fifth of the anterior wall of the tube. The rest of the anterior wall and floor are formed by a fibrous membrane. We see the formation of the membrano-cartilaginous portion of the tube is quite ingenious, in that the narrow cartilaginous plate, in the upper part of the tube, also forms the upper part of the anterior walls and tends to preserve the patency of this part of its lumen. It is this upper portion of the lumen of the membrano-cartilaginous tube which represents the direct continuation of the bony canal.

It is well to remember this in all treatments of the Eustachian tube, in passing the catheter first, and especially in passing the bougie through the catheter into the tube—and most important of all is it well to remember it if the author's technique is used, i. e., passing a cotton-wound applicator or the tip of a Eustachian syringe through the cartilaginous part of the tube direct, without using the catheter as a guide.

*Technique.* The applicator is metal, with its distal end curved or bent to an angle of about 45 degrees. The curve or bend should be at various distances from the end, or in other words, we should have from three to five applicators—No. 5 to be inserted one-half inch into the tube; No. 4, three-fourths of an inch; No. 3, one inch; No. 2, one and one-fourth inch; and No. 1, one and one-half inch, the latter to be used only in exceptional cases. To treat the right tube we introduce the Holmes naso-pharyngoscope with the corrected upright image into the naso-pharynx through the left nostril. The instrument is now adjusted so that the upper half of the mouth of the tube is in plain view. If adjusted so that the entire mouth of the tube is in view, it seems to contort the image so that it is almost impossible to pass the applicator or syringe points for any distance into the tube. This is an important point for the beginner to remember. The applicator having been previously wound with cotton so that the tip and that portion to be inserted, as well as the bend or curve, is covered, it is now dipped into a five per cent cocaine and adrenalin solution and passed through the right nostril with the left hand in such a way that the tip of the applicator is on the floor of the nose. The operator now looks into the scope which he holds with his right hand and sees the applicator as it emerges into the naso-pharynx, with its tip pointing downward. Still holding it in this position, he carries it backward and outward into the mouth of the tube, which is from 8 to 12 mm. in a vertical direction, and, remembering that the floor and lower four-fifths of the outer wall of the tube is fibrous and therefore movable, and that the anterior part of the tube is funnel-shaped in the vertical diameter, he makes use of these anatomical facts and at once places the tip on or near the floor of the tube, inserts, and, again remembering that the upper part of the cartilaginous portion of the tube is patent and continuous with the lumen of the bony portion, he rotates the applicator or syringe tip outward, upward and backward, all the time keeping the instrument after its rotation in the upper part of the tube or between the anterior and posterior plates of the upper portion.

If the operator meets any resistance it is well to pause for a few seconds to anesthetize and deplete the mucous membrane, then gradually pass the applicator a little further, and so on until the isthmus is reached, then leave it in place for a few seconds to thoroughly deplete the mucous membrane. It is well now to withdraw the applicator and immediately introduce another, wound as the first one with cotton, but less abundantly, for at first the operator was feeling his way and had the point well protected for fear of traumatism to the tube. He now wants to accomplish two things—to go through the isthmus, for here strictures or adhesive bands are most often found, and, at the same time, treat the entire cartilaginous tube with a one per cent solution of nitrate of silver, or perhaps argyrol. Again the same technique is used, but this time a No. 3 or No. 2 applicator, wound very thinly but securely with cotton, is employed. He passes it as before for about an inch into the tube, after first dipping it into a one per cent solution of nitrate of silver. It will now pass through the isthmus very readily, providing the tube is patent. The operator, as well as the patient, can feel the peculiar sensation, as with slight pressure the applicator slips through, apparently into a cavity. If the tube is obstructed, either by stricture or fibrous bands, the operator uses the same precaution as to force as he would in passing sounds into the urethra; in fact, force is never justifiable, a slight continual pressure being all that is necessary in any case. Success may not be obtained the first time, but it is better to wait and try again later. Electrodes and bougies, if made properly, can be passed by this technique.

*Treatment.* It is not the province of this paper to go into the treatment of catarrhal deafness very extensively, but merely in a brief way to emphasize those things which in the author's opinion are most essential, as inflammation extends by continuity of tissue. The first things to accomplish in each and every patient is to put the nose, naso- and oro-pharynx in as nearly a normal condition as possible.

(a) Remove enlarged or infected tonsils and adenoids. The naso-pharyngoscope has proven to me that 75 per cent of people of whatever age have adenoids, and it is almost impossible to find healthy tonsils in the adult. Both adenoids and tonsils should be removed with the greatest care. No case should be discharged until the naso-pharynx has been thoroughly examined, say a month or six weeks after the operation, to see that there are no adhesive bands extending across Rosenmuller's fossa to the cushion of the tube. These will cause deafness, and the osteopaths are now curing

deafness by what they think is merely massaging the mouth of the tube, but in reality they are breaking up these adhesions. Again, the palatal muscles have more or less control over the patency of the tubes and therefore should be freed from all adhesions.

- (b) Too little attention is paid to ethmoiditis and sphenoiditis.
- (c) All neoplasms of the nose and throat should be removed.
- (d) Spurs and ridges are thought to cause a contraction of the tensor tympanic muscle, which interferes with the normal tension between the drumhead, the ossicles and the labyrinthine fluid, and thus causes deafness and tinnitus.

In fact, every abnormal condition of the nose and throat should be corrected before the ear treatments are begun. This will often cure the deafness.

After recovery from all throat and nose operations, and especially secretions in the naso-pharynx, the author passes an applicator wound with cotton, which has been dipped in a five per cent solution of cocaine and adrenalin in one tube, and immediately follows this by another dipped in a one or two per cent solution of nitrate of silver. The next day the other tube is treated in a like manner. This mode of treatment is continued until the hearing is improved or until the tubes are patent. The author has treated each tube every day, but feels that better results are obtained, perhaps, by not treating so often. It may be better, after the first week or two of treatment, to only treat each tube twice a week, then once a week. Finally the patient will tell you himself that the air passes freely, at which time it is best to lengthen the interim between treatments.

It must be remembered that we treat the tube for a double purpose—first, to open the tube for the purpose of restoring normal tension between the drumhead, the ossicles and the labyrinthine fluid; and, second, to treat the mucous membrane of the tubes as you would the mucous membrane of the urethra or the mucous membrane of any other part of the body. Thus good results are obtained by continuing the treatment after the tube stays open. In some cases the deafness is greatly relieved or cured, but the tinnitus continues; however, it will generally become less and less in intensity as the treatment is continued. I seldom use inflation for the reason that in my practice most cases have previously been treated time and time again by inflation and vibration of the ossicles without getting any permanent relief. A stricture or fibrous bands in the tube cannot be relieved by inflation. Thus good and lasting results cannot be obtained. It is surprising how quickly these same cases

can be restored to usefulness by the direct treatment of the tubes. The author has cases which have been treated off and on by various otologists in different cities without apparent relief, and yet they have not heard a telephone ring in ten or twenty years, much less the tick of a clock.

These cases have been made to hear normal conversation by the direct treatment of the tubes. Of course, the prognosis is not good in those cases where the occlusion of the tubes has not been a factor in the cause of the deafness, or in those cases where the deafness and tinnitus is caused by adhesive bands within the tympanum. In all other cases the results for useful hearing have been very encouraging.

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**Treatment of Maxillary Fractures.** V. H. KAZANJIAN, *British Medical Journal*, Feb. 19, 1916.

In the treatment of maxillary fractures coming under the notice of the military surgeons, the oral surgeon follows a somewhat different method. Instead of connecting the parts together with wire sutures or metal plates fastened to the bones, the oral surgeon accomplishes his fixation by utilizing the remaining teeth or roots and the alveolar ridges assisted by bandages and chin and head supports.

Cases with extensive loss of soft and bony tissues are treated as follows: First, control the infection by free drainage and frequent irrigation. Second, do not attempt suture or closure of gap in soft parts until the permanent splints are adjusted and union of the bony fragments is well under way. Third, in adjusting the appliance, special attention should be paid toward holding the fractured parts in their normal position, using the normal occlusion of the teeth as the guide.

STEIN.

## **PERFORATING WOUND OF THE FRONTAL SINUS RESULTING IN MENINGITIS AND DEATH; REPORT OF A CASE.\***

**DR. WILLIAM WESLEY CARTER, New York City.**

On December 10, 1915, there was admitted to my service in Gouverneur Hospital, a powerfully built man, twenty-three years of age. The patient was unconscious at the time of admission, and the following history was obtained from his friends:

He had always been perfectly healthy. He was not a drinking man. He had never had syphilis. His mentality was normal and he was not subject to epileptic seizures.

On December 5, five days before being admitted to the hospital, he was in a fight and received a stiletto wound over the right eye. He paid little attention to the matter, telling his friends that he had bumped his head against the door, and continued his work as a stevedore for four days after the injury. He then complained of headache and vomited several times. Shortly after this he became drowsy and then unconscious. An ambulance was called and he was removed to the hospital. This was five days after the injury, and five hours after he had become unconscious.

I happened to be in the hospital at the time and examined the case at once; the following conditions were noted: Patient in a state of coma. Breathing stertorous. Right pupil contracted and left dilated. Both respond to light. Plantar reflexes present. Temperature,  $101.8^{\circ}$ , respirations, 25.

An insignificant appearing cut one-half inch long was noted about an inch above the right eyebrow. There were no signs of inflammation, and the edges of the cut were already united by primary healing. A lumbar puncture was made and turbid cerebro-spinal fluid under high pressure was withdrawn. This showed the presence of gram-positive intra- and extra-cellular diplococci.

Dr. E. G. Zabriskie was called in consultation, and after concurring in our diagnosis of meningitis, he advised exploration of the wound and a sub-temporal decompression.

A longitudinal incision was made directly over the wound, and a perforation in the anterior wall of the frontal sinus about the size of a lead pencil was discovered. The anterior wall of the sinus was removed. This cavity was filled with blood-clot and the lining mem-

\*Read before the New York Academy of Medicine, Section on Laryngology and Rhinology, January 26, 1916.

brane was intensely congested, there was no pus. At a point corresponding to the external wound, there was an opening in the posterior wall of the sinus and the dura. A probe showed that the brain had been punctured to a depth of about one-half an inch. The depth of the sinus at this point was one-half an inch. The opening in the posterior wall was enlarged, but the dura was not further incised, as the pressure was so great that there would have been an immediate expulsion of brain substance. There was intense congestion of the brain coverings, but no pus. A rubber tissue drain was inserted and the external wound partially closed.

I then proceeded to do a sub-temporal decompression. An incision was made from the vertex down to the ear on the right side, in diameter was removed. A canula was then inserted into the right lateral ventricle. A considerable quantity of slightly turbid cerebro-spinal fluid under great pressure was withdrawn. This fluid continued to discharge after withdrawal of the canula. The dura was not incised as there was no evidence of pus beneath it (only intense congestion) and the great pressure would immediately have caused a hernia cerebri. This wound also was drained with rubber tissue.

The patient did not recover consciousness, but died twelve hours after admission to the hospital.

A detailed account of the autopsy would serve no useful purpose in the description of this case. Suffice it to say that a greenish-yellow purulent exudate was found in the meshes of the pia-arachnoid over the vertex of the brain, in the anterior and posterior subarachnoid spaces and in the velum interpositum. The findings corroborated fully our clinical and operative diagnosis and indicated the tissues retracted and a button of bone three-quarters of an inch the cause of death as being due to stab wound of the brain through the frontal sinus, and purulent meningitis.

Points of interest in the case are: (1) The unusual character of the injury. (2) The length of time that elapsed after the injury before symptoms set in (the patient being able to continue his work for four days after being stabbed). (3) The possible spread of the infection from the frontal sinus to the meninges. The external wound having been closed by primary healing. (4) The futility of operative procedures after meningitis has set in.

This case emphasizes the fact also that wounds of the frontal sinus should be immediately and thoroughly explored and search made for perforations of the posterior wall.

69 West Fiftieth Street.

**CORRECTION OF DEPRESSED NASAL DEFORMITY BY THE  
TRANSPLANTATION OF CONJOINED BONE AND  
CARTILLAGE. AUTHOR'S OPERATION,  
INTRANASAL METHOD.\***

DR. WILLIAM WESLEY CARTER, New York City.

The patient, a fourteen-year-old girl, is from my clinic in Gouverneur Hospital. She fell, striking on her nose when she was five years of age. As she grew older a marked depression developed below the ends of the nasal bones. There is an obstruction to nasal breathing. The girl has always been healthy and strong and there is neither history nor suspicion of syphilis.

Examination shows a depressed deformity affecting the cartilaginous dorsum of the nose. There is no resistance on palpation at

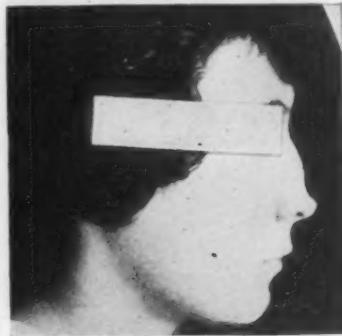


Fig. 1. Before operation.

this point, showing that the tissues are not supported by the septum.

The cartilaginous septum is neither crushed nor is it deflected, but is undeveloped, apparently having ceased to grow after the injury; it does not extend high enough to support the nasal bridge. The case shows well the results of the absence of the developmental power usually exerted by a normal septum.

The details of my operation for correcting this deformity have been previously given to this Section. Briefly, it consists in resecting a portion of the ninth rib, about two inches in length, two-thirds of

\*Read, together with presentation of patient and x-ray demonstration, before the New York Academy of Medicine, Section on Laryngology and Rhinology, Jan. 26, 1916.

the section being rib, and one-third costal cartilage, the periosteum being preserved on its outer surface. This fragment is then split in its transverse diameter and the outer half trimmed to suit the deformity.

After the left nasal cavity has been freed of its vibrissae, thoroughly cleansed and painted with tincture of iodin, an incision is made with a small, spatula-shaped knife in the roof of the nasal cavity at a point corresponding to the interval between the upper and lower lateral cartilages. Through this the tissues over the bridge of the nose are elevated and cut made into the frontal bone just above the fronto-nasal spine. With a small knife, the blade of which is curved upon itself, a pocket is made towards the tip of the nose.



Fig. 2. After operation.

The transplant is then introduced, the upper bony end being tucked under the periosteum over the naso-frontal process and in close contact with the bone. The tip of the nose is then pulled downward and the lower cartilaginous end of the transplant is slipped into its pocket near the nasal tip. The edges of the incision naturally fall together and no suture is used to close the wound. The nasal cavity is packed with vaseline gauze for twenty-four hours. This patient was operated upon on December 7, 1915. You will observe that the deformity is perfectly corrected and that the transplant is firmly united to the frontal bone seven weeks after operation.

This method of operating has the following advantages over the external route: (1) There is no external scar. (2) The swelling of the tissues is less, as the opening in the subcutaneous sac is at the

lowest point, thus favoring drainage. (3) The wound is less liable to infection, as the normal nasal secretions inhibit, if they do not actually destroy bacterial growths. (4) The use of conjoined bone and cartilage enables one to repair the bony bridge with bone and the cartilaginous bridge with cartilage; thus reproducing as nearly as possible normal conditions, and preserving the flexibility of the nasal tip.

The results in the cases that I have done by this method have been entirely satisfactory.

69 West Fiftieth Street.

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**Syringing the Ear.** MAX LUBMAN, *New York Medical Journal*, Vol. CIII, No. 2, Jan. 8, 1916.

Author decries the practice of syringing the ear, as it is frequently done. He thinks that water is often an irritant to chronically inflamed tissues, and the practice of syringing in these cases is often harmful. He believes that more attention should be paid to the contributory causes, that is, adenoids, nasopharyngitis, etc.

PACKARD.

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**The Origin of the Naso-Antral Polyp.** DR. D. J. GIBB WISHART, *Canadian Medical Assn. Journal*, Jan., 1916.

The writer discusses the original observation of the attachment of the pedicle of the solitary uni-lateral polyp, to one of the walls of the antrum, made by Killian, and the series of observations thereon by Brown-Kelly, and cites the history of six cases of his own, in which he had made the same observation and verified it by the radical antrum operation.

These cases did not bear out the observation of St. Clair Thomson that "pathological secretions of all kinds in the nose are the general immediate cause of these inflammatory hypertrophies," nor that of Phillips, "a history of previous attacks of purulent sinusitis is obtainable."

WISHART.

CASE OF PEMPHIGUS INVOLVING THE NOSE AND THROAT  
DUE TO THE STREPTOCOCCUS HEMOLYTICUS. TREAT-  
MENT WITH AUTOGENOUS VACCINE.\*

DR. WILLIAM H. HASKIN, New York City.

G. ——, 57 years of age; male. For the past eight weeks he had suffered much with sore throat and mouth, which had grown worse although under the treatment of two other physicians. The beginning of the illness was traced back to the extraction of two ulcerated teeth. For three weeks large vesicles had been arising over his body at irregular spaces, which burned badly, changed to pustular eruptions, and then dried up under a hard, elevated dry scab, without any marked ulceration, although each spot bled very easily when scab was removed. His nose was completely blocked at the anterior nares with these large hemorrhagic scabs, which seemed to form as rapidly as they could be removed. Both lips were involved throughout, and were cracked and extremely sore.

On examining his throat, both tonsils were seen to be enormously swollen, and pus poured out of both in two or three places. The mucous membrane of the cheeks and tongue seemed to be involved throughout. He could not swallow anything but a few drops of water at a time.

After a negative Wassermann was found, he entered the Manhattan Eye and Ear Hospital and a careful study was made, the diagnosis of pemphigus having been determined upon. The literature was most discouraging, and gave no true light as to the nature of the disease.

Cultures from the nose, tonsils, and blebs over the skin all gave the same bacterium—streptococcus hemolyticus. Two blood cultures proved to be negative. Accordingly, a vaccine was made and given every other day, starting with 300 millions. Two doses of Hiss' leucocyte extract were also given. The disease showed immediate improvement, and at the end of ten days the tonsils were reduced and no pus could be sucked out; the skin had shown no new outbreaks; and the mouth was very greatly improved, so that the patient went home on account of the expense.

He was not seen for two weeks, but then returned because of his mouth which was still very sore, and he had two small blebs

\*Read before the New York Academy of Medicine, Section on Rhinology and Laryngology, Feb. 23, 1916.

on his body. His mouth was in a filthy condition, as he said he could not clean his teeth because of the pain. Each tooth was gone over, thoroughly cleaned, and painted with Mandel's solution, and two were found from which pus was pouring out. It was advised that these be extracted at once, and the man promised to have it done, but has not returned since.

I firmly believe that the streptococcemia in this case arose undoubtedly from the abscessed teeth, the history showing that it began after the extraction of two ulcerated teeth. I also believe that it will be cured only after all the remaining foci have been removed, because of the man's tremendously lowered resistance to the entrance of those germs. He had a severe nephritis while in the hospital, but when he was last seen this had cleared up.

While working on the cultures of this case, Dr. Dwyer was told of a similar case by Dr. West, who was a post-graduate student at the College of Physicians and Surgeons, with the same bacteriological findings, treatment with vaccine and cure.

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**Recent Developments in the Treatment of Leprosy.** DR. V. G.

HEISER, *New York Med. Jour.*, Feb. 12, 1916.

This paper is important to rhinologists for the reason that Dr. Heiser, from his extensive experience covering the examination of ten thousand cases of leprosy in Louisiana, Hawaii, the Philippines, Australia, Malay States, India, Ceylon, Egypt and other countries, is firmly convinced of the importance and constancy of a nasal ulcer situated on the septum at the junction of the cartilaginous and bony portions as the earliest sign of leprosy. Even when an actual ulcer cannot be found, the terminal results of the ulcer can be demonstrated and in such scarifications the lepra bacillus may often be found. The treatment which has given the best results thus far in the treatment of leprosy consists of a mixture of chaulmoogra oil, 60 c.c., camphorated oil, 60 c.c. and resorcin, 4 grams. One or two cubic centimeters are injected hypodermically in the gluteal region every eight days and the dosage is increased until 5 c.c. are injected every three days. While this particular mixture has been employed only for the past year, the reports from the various countries in which it is used have been exceedingly encouraging. P. F.

## A CASE OF EIGHTH NERVE NEURITIS WITH INTERESTING GALVANIC FINDINGS.\*

DR. GEORGE W. MACKENZIE, Philadelphia, Pa.

In reporting the present case I am doing so in order to show the value of the galvanic test in the diagnosis of eighth nerve lesions and in noting the comparative changes in the intensity of the process from time to time. In fact, there is no other test or combination of tests that tells us so much in this class of cases.

The case was that of H. E. K., male, aged 47, in apparently good health, referred to me December 21, 1915, by Dr. P. S. Stout. Dr. Stout informs me that the family history is negative; personal history constipation, otherwise negative. From the patient the following history was obtained:

He began two months ago to have attacks of dizziness which would come on suddenly. He referred the sensation to his head but added that later it would affect his stomach and make him nauseous. These attacks would last about a day, more or less, then he would be all right again for several days, or longer. With the dizzy attacks external objects seemed to move and jump, but in no particular direction. He was forced to catch hold of some fixed object to prevent himself from falling. He was obliged to go to bed and stay there while the attack was on. If he attempted to sit or move about, the dizziness became decidedly worse. The last attack was six days ago. However, he has suffered as many as three attacks in a week. He has had his eyes examined to help the dizziness, but there was no improvement.

He has had roaring in the ears and some deafness which started about the same time as the dizziness. He has never had any discharge from the ears. The patient believes the trouble in his ears began with a cold which started the latter part of August, 1915. The patient claims to have a catarrhal cold all the time.

### Functional examination of hearing:

Right Ear	8 M. + Conversation Voice	8 M. +	Left Ear
3 M.	Whispered Voice	3 M.	
1.25 M. Acumeter			6 M.
Length 15", +,	Weber	Indifferent	
Very sli. short	Schwabach	Length. 10", Normal.	
Very sli. short (?) c <sub>4</sub>	Rinne	+ 10"	
Short 5" (?) Air		Normal	
		Normal, normal	

Patient says that the c<sub>4</sub> fork seems to be higher on the right side than on the left.

\*Read before the Philadelphia Laryngological Society, Feb. 1, 1916.

*Examination of Static Function and Nerve.*

When looking straight ahead the eyes show the slightest (1 mm. excursion movement of eyes occurring every 5 or 6 seconds) rotatory nystagmus to the right, which becomes decidedly more pronounced when looking to the right and becomes nil when looking to the left. When looking far to the left there is a moderate degree of nystagmus to the left, but less intensive than the nystagmus to the right which the patient manifested on looking to the right.

Horizontal turning test showed, after 10 turns to the left with head erect, horizontal nystagmus to the right lasting nineteen seconds.

Galvanic test showed:

*Right Ear**Left Ear*

Kathode,  $3\frac{1}{2}$  M.A. rot. nyst. to right. Kathode, 8-10 M.A. rot. nyst. to right.  
Anode, 8 M.A. rot. nyst. to left. Anode,  $4\frac{1}{2}$  M.A. rot. nyst. to left.

The patient claims that the dizziness produced by turning, but more especially by galvanism, is of the same character as that which he had and for which he seeks relief.

*Otoscopic Examination.* Right ear shows a slight amount of cerumen in canal. After its removal membrane was found to be somewhat opaque, however brilliant; no especial retraction and slight overmobility with Siegel and by Politzer inflation the tube was found to be patulous.

Left ear membrane intact, slightly opaque, brilliant, normal mobility with Siegel, small chalk deposit in posterior part of membrane near the umbo. No retraction. Eustachian tube patulous.

Examination of nose showed the mucous membrane to be somewhat pinker than normal. Deviation of septum to left with spur in cartilaginous portion overlapping the vomer. Middle-turbinate region not visible on either side prior to shrinking. Slight secondary catarrhal pharyngitis. Tonsillar fossae free. After shrinking mucous membrane of the nose a pink spot was noted on the left side running along the upper margin of the vomer two-thirds of the way back. The middle turbinate region was found to be quite normal after shrinking.

The patient was referred back to Dr. Stout, with the report that he was suffering from a neuritis of both branches of the right eighth nerve, of moderate degree. I suggested that he have a Wasserman made, and look further if necessary to ascertain the etiological factor in the case.

The patient was again referred to me on January 6, 1916. At this time he reported that he had done well until the day before, when he was taken with an attack of dizziness and objects seemed to go around. He became sick at the stomach and vomited three or four times and was taken home in a taxicab. Dr. Stout was called in to see him. The vertigo is not present to-day. Blood pressure and pulse were both found to be normal. He feels weak as the result of yesterday's experience.

Spontaneous nystagmus was present and rotatory to the left of only slight degree when looking straight ahead but increased when looking to the left, absent when looking to the right.

Galvanic reaction:

*Right Ear*

Kathode, 8 M.A. rot. nyst. to left. Kathode, 5 MA. rot. nyst. to left.  
Anode, 4 M.A. rot. nyst. to right. Anode, 8-10 M.A. rot. nyst. to right.

*Summary:* From the galvanic tests alone we are able to conclude that the patient was suffering from a neuritis of the eighth nerve, notwithstanding on the two occasions when he was examined the findings were practically reversed. On the first examination, the neuritis was of a very moderate degree and the right nerve was slightly over-irritable, for with the kathode it reacted with somewhat less amount of current than is normally required to produce a reaction. The difference between the amount of current to produce a kathodal and anodal reaction was equal to 4 M A, or a trifle more, a difference in reactivity just sufficient to warrant a spontaneous nystagmus.

The reactions in the left ear balance with those in the right ear but with reversed polarity.

In short, we have here an irritative lesion in the right eighth nerve where the prognosis is more favorable than in a destructive type of lesion with loss of function.

On the second visit we found the reactions entirely different and the spontaneous nystagmus reversed to the left (the well side), showing the destructive or suppressive type of right nerve lesion. In this case the diminished reactivity of the nerve gives a more unfavorable prognosis than the first. By comparing the figures in the report above we are able to note these two distinctly different types of galvanic findings. Yet both are found in one process. The difference in the findings informs us as to the difference in intensity of the pathologic process. In the first instance there is a hypersensitiveness of the nerve; in the second, a diminution, almost a suppression, of the function of the nerve.

The question may be asked why I did not put my faith in the caloric and the turning tests. The answer is that neither of these tests nor both combined could give me the information that the galvanic test did. The caloric test could have told me nothing on the first visit, for at most it can merely tell us that there is or is not function, but it can never tell us the amount of function; in other words, it is not a quantitative test. On the second visit, thermic changes in the canal would have produced no reaction, and no reaction may mean destruction in the inner ear or nerve, but it could not enlighten us as to which of these two parts was affected. The caloric test is no test for differential diagnosis.

What about the turning test? It is more or less a quantitative test but of no value in aiding us in the differential diagnosis between inner ear and eighth nerve lesions. Furthermore, as a quantitative test it is less sensitive and accurate than the galvanic test.

The caloric and turning tests are less under our control than the galvanic, and are followed by longer-lasting ill effects.

The question may be asked, Do I wish to discount the caloric and turning methods of testing the functions of the inner ear? My reply is, No. Each method of testing has a value in a particular type of case. On the other hand, for the diagnosis of eighth nerve lesions, for the differential diagnosis of eighth nerve lesions from pure internal ear lesions, for noting secondary degeneration of the nerve following suppuration of the internal ear and noting the progress favorable or otherwise in the course of a neuritis, the galvanic test is the only test we have.

Since the galvanic test is the only test whereby we could arrive at a diagnosis in the case under discussion, the caloric and turning tests would have been superfluous. They could only have added to the discomfiture of the patient without adding anything to our knowledge of the case.

1831 Chestnut Street.

## A CASE OF CURIOUS NASAL REFLEX. SNEEZING AND VOMITING DUE TO THE PRESENCE OF A NASAL SPUR.

DR. FRANKLIN HAZLEHURST, JR., Baltimore, Md.

This case seems odd enough to be made the subject of a detailed report. The patient, a machinist, aged 36, came first to the Medical Dispensary of the Johns Hopkins Hospital in December, 1911, complaining of pain and soreness in the abdomen. He was examined by Dr. S. R. Miller who, in the absence of positive abdominal findings, and in view of the patient's complaint of frequent attacks of sneezing followed by vomiting, referred him to the Laryngological Dispensary.

Here it was learned that the patient had had, over a period of two years, frequent attacks of sneezing, very violent in character, occurring at least once and often twice a day. These attacks were always associated with the ingestion of food, came on during or just after meals, and when he had eaten heartily, were nearly always followed by vomiting the food just eaten. If he ate a very light meal, for instance a sandwich only, there was no sneezing. The patient thought that inhaling the smoke of oil torches by the light of which he had to work in the railroad yards, had possibly something to do with his trouble. Since the onset of his ailment, he had lost weight, and, owing to the persistent abdominal pain, was much worried about himself. He complained also of right-sided frontal headache extending at times to the temporal, mastoid and post-cervical regions. This headache was not constantly present, coming on perhaps several times weekly.

General physical examination was quite negative. In the right side of the nose there was a sharp septal ledge which pressed against the inferior turbinate, actually indenting it for the greater part of its length. Could this septal spur be responsible for the odd train of symptoms manifested by the patient? If so, in what way? It occurred to the writer that coincident with the increased congestion of the face and jaws during the act of mastication, there might be an increase in the flow of blood to the nasal mucosa. In favor of this possibility, was the fact often observed that the nasal secretion tends to be increased by the act of mastication. With increased swelling of the nasal mucosa, there would naturally follow a closer approximation of the surfaces of the inferior turbinate

and the septum, causing pressure of varying grade according to the amount of the swelling. Sneezing mild in character, if the pressure were slight or of short duration, of more violent type should the pressure be greater or more prolonged, might result. The headache might also be due similarly to intra-nasal pressure.

Acting upon this theory, a submucous resection of the spur was done December 11, 1911, with a most gratifying result. The patient reporting eighteen days later, professed very marked improvement. In this interval, he had been free of the headache and almost free of sneezing, having had only three very mild attacks unaccompanied by vomiting. There seemed a rational explanation for each of these mild attacks. The first occurred while the packing was still in the nose (pressure of the packing?), the second two days after the packing was removed (reactionary swelling?) and the third, a few days later, apparently due to the irritation of a blood clot which the patient blew from his nose immediately after sneezing.

January 17, 1912, he reported a couple of "good" sneezes, that is mild and unaccompanied by vomiting. Reporting two weeks later, he felt very well, had had no more sneezing or vomiting, the abdominal symptoms had quite cleared up, he had gained greatly in weight, his clothing getting too tight for him.

For six months following this visit there was no recurrence of any of the symptoms. He returned, however, in August, 1912 reporting that in the week previous he had four of the old sneezing spells, three of them followed by vomiting. The writer's belief in the nasal origin of the patient's trouble was a good deal shaken but he was relieved to find at the site of the operation an adhesion between the inferior turbinate and the septum which he thought might bear a causal relationship to the symptoms. After the thorough removal of this adhesion, there was no further return of the original symptoms.

It is evident that the sneezing was of reflex nature, the inciting factor, pressure upon the nasal mucosa. The vomiting which so often followed the sneezing, was probably not due directly to a reflex originating in the nose, but to pharyngeal irritation induced by the violent sneezing. As evidence inclining to this view may be regarded the facts that sneezing frequently occurred unaccompanied by vomiting (following a light meal), and that vomiting was always preceded by violent sneezing, and never arose coincidentally.

108 W. Saratoga Street.

## EDITORIAL DEPARTMENT

### PERORAL ENDOSCOPY AND LARYNGEAL SURGERY

EDITED BY

DR. CHEVALIER JACKSON, Pittsburg.

#### ENDOSCOPY AND THE WAR.

Among the few consolations of the horrible Great War are the incidental advances in medicine and surgery, which will be especially valuable because of the systematic records and the enormous scale of the statistics. As a rule, the value of statistics, other things being equal, is directly as the number of cases recorded, because of the necessarily diminished error in deductions due to variations. It seems, however, less likely that endoscopy will profit as much by statistics as by observation in isolated cases. Injuries of the larynx and trachea are doubtless not infrequent. Most of these will doubtless fall to the general surgeon and in many instances there will be little time or opportunity for endoscopy. There are, however, now established, back of almost all fronts, base hospitals fully equipped in all special departments. Practically all the younger laryngologists interested in endoscopy are in the field; though so far as we have been able to learn, they are serving in the Medical Corps as general surgeons, and special cases are brought to them both incidentally and in addition to their regular work. An ideal case for bronchoscopy would be one in which a gunshot wound of entrance in the right or left chest, not too low, with a radiograph and bloody expectoration pointing to lodgment of a bullet in a bronchus. The high velocity and great penetration of the modern rifle bullet has greatly diminished the number of gunshot cases without wounds of exit, but the enormous number of shrapnel shells used furnishes many missiles of low penetrative power. A parallel case in the esophagus would seem less likely though cicatricial stenosis following penetrating wounds would seem probable. The editor has reported one such case, but in it there had been an external operation for removal of the bullet from the peri-esophageal tissues of the neck. The use of asphyxiating gases should offer opportunities for bronchoscopic relief. Only one such case has come to our knowledge. Mr. Ernest Waggett reports one very severe case in which he found the larynx normal, trachea very slightly affected, bronchi intensely injected. With ether anesthesia he removed much of the foam with good effect on the respiratory organs. The patient died two days later with cardiac symptoms. Doubtless there will be many cases ultimately reported, though Major Waggett states that respirators and helmets have proved efficient protection.

## SOCIETY PROCEEDINGS.

### NEW YORK ACADEMY OF MEDICINE.

SECTION ON LARYNGOLOGY AND RHINOLOGY.

*Regular Meeting, January 26, 1916.*

DR. HENRY L. LYNAH, Chairman.

**Stenosis of the Trachea: Primary Endothelioma.** DR. WOLFF FREUDENTHAL.

Dr. Freudenthal said he had first presented this patient before the Section three years ago; a second time, about a year ago, and he was presented again this evening at the suggestion of the Chairman, for it was a most interesting case. The man had first come to him a little over three years ago, with a marked dyspnoea, of tracheal origin. Examination revealed a grayish-looking circular web, corresponding to a tracheotomy that had been performed on him some time before. The examination which was made afterwards under suspension laryngoscopy revealed a marked difference in the appearance from that obtained by the indirect method. It was necessary, however, to do a hurried tracheotomy; the mass was removed, and the mucosa was cauterized. The man recovered very quickly. He came back again a year later, and the same performance was repeated. Nine months later he returned again. The condition seemed to be suspicious, and this time Dr. Freudenthal tried to remove the mass by means of the tracheoscope, but the bleeding was so profuse that the trachea had to be opened up again, for the third time. A good many masses were removed, and the microscopical examination showed them to be endothelioma. The question then arose whether to apply radium or to do another operation—the removal of some of the tracheal rings, and thus remove the base of the neoplasm. At that time the patient was presented before the Section and several of the men discussed the case. Dr. Freudenthal said that if he remembered correctly, Dr. Carter thought in operating one should not go beyond the box of the trachea, or the mass would spread very rapidly. There is much truth in that theory, yet after radium had been applied without effect, nothing was left that could be tried, for the mass recurred so frequently. Accordingly, with the assistance of Dr. Goodman, Dr. Freudenthal operated and removed two or three rings from the trachea. When the case was discussed, one of the members said that it would be quite easy to perform the operation; but some trouble was expected on account of the previous operations. As a matter of fact, there were a great many adhesions. The bleeding was profuse, and it was necessary to stop frequently in order to tie the many vessels. After the operation there was quite a little reaction for some weeks afterward. There were numerous little irregular masses, and a recurrence was feared, but gradually there was complete healing, and the case presented the picture now seen. When examined that morning, there was an appearance as if there were a second glottis, for there was a mass from

the left side, and another a little lower on the other side. On the left side it used to be quite white, and there was some doubt as to whether it was cicatrical tissue, or a piece of cartilage from a former operation. This point had not yet been decided. It is now a little inflamed. On the other side there is a reddish mass, and it may be an endothelioma, or it may simply be granulomatous tissue. Dr. Freudenthal said he did not like to operate now, and thought he would attempt to stretch the mass and give the man sufficient air, if the growth does not again recur.

#### DISCUSSION.

DR. COAKLEY asked how much radium was used, where, and what method was employed? Was it given through the tracheotomy tube, or how?

DR. FREUDENTHAL said that these were very important points. While the trachea was still open, and the wound had not closed, 75 mgr. of radium bromid was applied—a very strong mixture—and it was left in place for two days. There was no danger of any edema. Dr. Freudenthal said he thought that if the masses were to be removed there was no danger in giving too much radium; but it had absolutely no effect. At present, the man has no dyspnoea.

DR. CARTER said that his remarks at the earlier presentation of this case had reference to malignant growths in the larynx. He thought that if it were possible to remove the growth by the intralaryngeal method, it would be better than to attempt the external method, where, with the laryngeal box being open there was danger of a spread of the malignant growth to the surrounding tissues. Extra-laryngeal growths are very hard to manage.

DR. QUINLAN asked whether there was any contraction since the tracheotomy or was the condition about the same as before the operation.

DR. FREUDENTHAL replied that the opening was getting narrower.

DR. QUINLAN thought it would be an ideal case for an intubation tube, or it might possibly be dissected out and allow a large calibre tube to remain in for some time. There was nothing visible in the upper, inner, or lower sides, excepting a fibrous web with an elliptical opening. Freudenthal seemed to think that on the right side there was a slight evidence of some return of the growth, but there was nothing apparent but a pinkish band, such as would follow a tracheotomy. The condition was purely mechanical, and some mechanical device might help the man's voice. He was not suffering from any dyspnoea. Of course if there was any interference with the respiratory function of the larynx, a tube should be applied.

DR. COAKLEY said that the little experience he had had with any such doses of radium as Dr. Freudenthal had spoken of would lead him to expect severe burns and destruction of tissue. That many milligrammes put into the nose for a bleeding mass, an angio-fibroma, had produced sloughing and awful destruction in twenty-four hours. He could not understand why in forty hours it had produced no effect.

DR. FREUDENTHAL said that it was not pure radium. He had had once a severe burn outside of the larynx in an entirely different case, for the very good reason that the radium had not been screened; but in this instance the radium was put in a special box and kept there. He has used radium for more than ten days on big tumors in some instances and it

had absolutely no effect as a mass of connective tissue was kept from forming and prevented the rays from spreading. In this case there was absolutely no effect.

Replying to Dr. Carter's remarks, Dr. Freudenthal said he had had all sorts of trouble with this young man, and a tracheotomy had to be performed repeatedly; he was afraid to allow it to be done without general anesthesia. That was one reason why something radical had to be done.

DR. CARTER asked what was the distinction between pure and impure radium. According to his understanding, radium is an element, and the term "impure radium," used by Dr. Freudenthal, referred merely to a reduced strength or a smaller quantity. It could not mean a reduced strength, but merely a smaller quantity. He would like to know what distinction Dr. Freudenthal makes.

DR. FREUDENTHAL replied that the pure radium is an element, but one gets very little of that here. Most of it has some other salt connected with it, but a little does not make much difference, for it is sold as such; formerly we got radium bromid or some other mixture where 50 per cent. or more was another salt; but it could not properly be called pure radium.

DR. LEDERMAN said he wished to emphasize the danger of applying mechanical measures to these laryngeal cases. Dr. Freudenthal had stated that he had to perform a hurried tracheotomy. Dr. Lederman said that he himself had had a case of almost complete stenosis of the larynx following typhoid fever in an adult, at Lebanon Hospital. The patient had previously been tracheotomized and was doing very well with an intubation tube, a four-year-old size. The external wound had closed and it was thought that there was sufficient opening to allow the use of Schroetter's tube to dilate the stenosis, after wearing the intubation tube for about three weeks. In removing the four-year tube for the purpose of putting in a larger one, the man became nervous, started to breathe hurried, gasped for breath, and became cyanosed; it was impossible to replace the tube, and to save his life a hurried tracheotomy had to be performed while he was sitting in the chair. Such a possibility might occur in any of these cases. The removal of the tube probably permitted a swelling of the tissues, from the relief of pressure, and the small opening in the man's larynx again became obstructed.

The Chairman thought the case referred to by Dr. Lederman must have had an extreme grade of stenosis or else the 4-5 intubation of the child's size would have certainly fallen below the vocal cords. He thought the sudden stenosis following the removal of the tube to be due to spasm plus polypoid tissue. He agreed with Dr. Quinlan that the case presented by Dr. Freudenthal could be cured by dilation of the tracheal stricture with bulbous tracheal tubes, provided the contraction was due to fungating granulation and cicatrix tissue.

**Correction of Nasal Deformity by the Transplantation of Conjoined Bone and Cartilage. DR. W. W. CARTER.**

(Published in the present issue of THE LARYNGOSCOPE.)

DISCUSSION.

THE CHAIRMAN said that this was the most remarkable result that Dr. Carter had presented before the Section and such a correction of a nasal deformity should not be passed without commendation.

DR. EMIL MAYER congratulated Dr. Carter on the splendid result obtained, and asked whether he erodes the frontal bone—roughen the edges—in order to make the graft unite.

DR. CARTER, replying to Dr. Mayer, said that he cut into the frontal bone and followed the little spatula-shaped knife with his left hand on the outside of the nose. It was inserted only once, and the whole thing was done without removing the knife. Osteo-genesis is expected at that point, for the periosteum over the frontal bone is not osteogenetic.

That question had been brought up in Boston last week, where he had read a paper on the subject of bone and cartilage transplantation before the New England Otological and Laryngological Society. It is a disputed question whether the transplant unites by osteoblasts from the frontal bone or whether they are included in the transplant and furnished by it. It is well known that in trephining the skull the buttons are usually united to the surrounding bone by fibrous tissue and not by bone.

DR. GUTTMAN asked if the photograph was a correct one, for it showed the concavity at the tip of the nose only; there was nothing to be seen on the dorsum of the nose. So far as there was no deformity shown in the picture, he would like to know what was accomplished by the bone transplanted at the bridge of the nose. If the tip was simply bent in, how was that corrected by putting in the piece of bone? Was it a convex piece, and how was it connected with the bridge?

DR. CARTER replied that the photograph was taken by the girl's father, who is a photographer on Grand street. The effect of the photograph is that the deformity is at the tip, but in reality it reached further up and included the whole cartilaginous dorsum of the nose. The transplant acts as a lever. It is anchored under the periosteum at the naso-frontal process and that is the fixed point; the fulcrum is the nasal bone, and the tip is raised by the long arm of the lever. The work in this instance is done by the long arm of the lever, and not by the short arm.

Case of Pemphigus Involving the Nose and Throat, Due to the Streptococcus Hemolyticus; Treatment with Autogenous Vaccine. DR. WM. H. HASKIN.

(Published in the present issue of THE LARYNGOSCOPE.)

#### DISCUSSION.

DR. MAYER said that there were now in the wards at Mount Sinai two patients with pemphigus of the mouth. If the facts reported by Dr. Haskin can be substantiated, he is to be congratulated upon having brought out something most remarkable and unusual, and of tremendous benefit to some of the most pitiable sufferers that we know of. Dr. Mayer regretted the fact that he was not so optimistic as Dr. Haskin.

On the 4th of December, two months ago, this patient was given an injection, and he improved under two weeks of treatment. One month from that time he was seen well, as far as the skin was concerned, but he was still having the crust formation in the mouth and it was still bleeding, and he was by no means a well man.

Dr. Mayer said that he could not accept the condition of the teeth as the provoking factor for the condition, for he had seen cases without this complication. However, this case is deserving of a great deal of study; and in the report Dr. Haskin mentioned one case as cured. It was all

important to know about that point, and to get the credit of originating something for these patients.

Dr. Mayer said that he would certainly mention this matter to Dr. Goldenberg who has charge of these patients at Mount Sinai, and ask him to follow up the subject. These patients have had salvarsan, quinin and every known remedy, but up to now he has always felt when he saw a patient with pemphigus that the sufferer was to be greatly pitied as we know of nothing that would help him.

DR. WILSON requested the Chairman to ask Dr. Sclichter to report a case that had apparently been successfully treated.

Dr. Sclichter then told of a woman about forty-three years of age who first noticed the lesions of pemphigus on the toes. From there, they spread up both legs, then to the fingers, and finally appeared all over the body, so that there was not a square inch which was not covered with the blebs. They would go through the usual form of bursting, forming enormous scabs, etc. She had so many blebs in the mouth that she would frequently blow out the exfoliation of the buccal mucous membrane and of the tongue way back in the pharynx, and then with her finger would punch a hole in it and so get air. On various occasions it was necessary to relieve the pharynx by cleansing with a swab; and at one time she had considerable dyspnoea and coughed up an almost complete cast of the trachea down to the bifurcation. One of the features of the case, which lasted for eleven months in the General Hospital at Elizabeth, was that the woman could always foretell an attack of the eruption. She would say in the morning that she felt as if she were going to have an attack that night, and almost inevitably that night the temperature would go up to 104.5° and a new crop of bullae would appear. That was ten or twelve years ago, before the vaccine treatment was known.

Finally, she was given increasing doses of Fowler's solution until she took about two hundred minims a day. She was seen by a number of dermatologists, all of whom advised quinin and gave a bad prognosis. All of her nails exfoliated, and some of them have never returned.

Dr. Sclichter said that he had seen the woman two months ago and she was in perfect health and said that the condition had never returned.

DR. MAYER said that arsenic had been tried and had failed in a good many cases; and that salvarsan was simply another method of giving arsenic.

DR. MORRIS MANGES confirmed what Dr. Mayer had said. One of the cases to which Dr. Mayer had referred was in his own service some months ago, and left very much improved. He had an interval of freedom from the disease for about six months, and then he returned, and died some months later.

In all his experience he had never seen a case of pemphigus recover. If Dr. Haskin had found a method of relieving them, it was a notable achievement. The apparent improvement in the case may be explained by the occurrence of the remissions in the course of the disease, rather than as the result of the vaccine treatment.

DR. HASPIN said he did not wish it to be thought that he believed all of these cases came from the condition of the teeth, but if the disease is of the streptococcus type the foci may come from anywhere in the

body. In the cases he reported, the man had definite foci which might account for the condition especially as a large proportion of the buccal infections are due to streptococcus viridans or haemolyticus.

He believed that this man would recover if he would submit himself to the proper treatment and use vaccine in large doses. In all of his experience he had never seen such a remarkable change for the better as came over the patient while he was in the hospital. All of the textbooks advise arsenic and quinin, but give no hope of recovery, so these were not tried at all. Salvarsan was not given, for that would be of no value in a streptococcaemia.

**Stab Wound of the Frontal Sinus: Death from Meningitis: Necropsy Report. DR. W. W. CARTER.**

(Published in the present issue of THE LARYNGOSCOPE.)

DISCUSSION.

DR. COAKLEY said he had seen a number of cases of meningitis, proved by lumbar puncture, following nasal accessory sinus disease. Some of these cases were operated, and others not. He had never seen any operative procedure carried on, where the patient had pus cells in the spinal fluid, benefit the patient at all. Such cases are beyond operative relief.

DR. CARTER, replying to Dr. Coakley, said that at the time both he and Dr. Zabriskle realized the hoplessness of this case and had no idea that operation would save the man's life, but the family had inquired if anything could be done for such cases and had urged an operation. Naturally they were not adverse to making an exploratory incision and doing what was possible, although it was believed to be a hopeless case from the start.

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**Simple Method for Estimating the Coagulation Time of Blood.**

M. W. LYON, *Jour. A. M. A.*, March 18, 1916.

This consists of the Biffi-Brooks apparatus (collapsible aluminum cup with cover; two pairs of notches cut opposite one another in the top rim of the cup; two pieces of platinum wire each with four loops). The cup is filled with water warmed to 37 C. to within one centimeter of the top. The loops of the wire are quickly touched in succession to the blood from a freely flowing puncture, the wires are suspended in the notches at the top of the cup and the cover gently laid over. At the expiration of two or three minutes the cover is removed and one loopful of blood gently immersed in the water. The same procedure is gone through with the other loops at one minute intervals, the wire and cup cover being quickly replaced after each test. By noting the lapse of time from the start until a loop of blood fails to wash out the coagulation time of the blood can be easily estimated.

P. F.

## PHILADELPHIA LARYNGOLOGICAL SOCIETY.

*Meeting, February, 1916.*

### **Results of the Implantation of a Solid Block of Paraffin for the Correction of a Deformity Following the Frontal Sinus Operation.**

DR. ROSS H. SKILLERN.

Dr. Ross H. Skillern presented a colored girl, age 20, who when first seen by him had three discharging fistulae, the results of some incisions which had been made by another operator. There was enormous cellulitis of the tissues of the left orbit, proptosis and advanced xerophthalmos. A complete Killian operation was done on the frontal sinus, which was found to extend all the way to the malar bone. It was necessary to remove the entire anterior plate of the frontal sinus and to exenterate the anterior and posterior ethmoidal cells and sphenoid, all of which were filled with granulation tissue and pus. The wound was partially closed, as a result of which a malodorous discharge persisted two months after secure position.

A secondary plastic operation was finally performed. Under ether anesthesia, all scar tissue was removed. Under strict asepsis, there was

The deformity one week after the operation was described as horrible. There was no left supraorbital ridge. A deep depression extended from the nasion to the left temple. Because of it the patient was unable to inserted in the wound, a solid block of sterile paraffin, molded to fit the the operation.

cavity and provide a supraorbital ridge. The block weighed, roughly, two grams. For several days there was considerable inflammatory reaction of the orbital tissues, on the second day involving those of the other side as well and yielding to antiphlogistic treatment. The left cornea was tattooed by Dr. L. Webster Fox.

The patient is now presented, three months later, with external wound entirely healed and so little facial assymetry as not to excite special notice. The hair is worn low so as to partially cover the scar.

### **Fracture of the Tympanic Plate of the Temporal Bone. DR. J. CLARENCE KEELER.**

Dr. J. Clarence Keeler presented a patient, M. W., a girl of 17, who was thrown from a motorcycle in July, 1914, landing on her chin. She regained consciousness in a hospital twenty-four hours later and complained of intense occipital pain, worse when in the supine and lessened when in the semi-recumbent posture. She was unable to sit up unassisted until after two weeks or stand alone until after three weeks.

The mandible was fractured at the symphysis. The two right upper incisor teeth were broken. There was bleeding from the left ear for 48 hours, at first profuse, then gradually subsiding.

Five weeks after the accident the patient applied for treatment at the ear dispensary of the Jefferson Hospital. There was pus in the left auditory canal, the tympanic membrane was lacerated. There was an ir-

regular, inflamed elevation on the floor of the canal, obstructing half its lumen. The right ear appeared normal.

There was distressing tinnitus and loss of aerial conduction. Weber to the injured side.

She has recovered from the middle ear infection and her hearing is restored.

The x-ray plates show the fracture at the symphysis, the broken teeth, a fracture of the left condyle of the mandible and a fracture of the tympanic plate of the temporal bone, with upward displacement.

**A Case of Eighth Nerve Neuritis with Interesting Galvanic Findings.**

DR. GEORGE W. MACKENZIE.

(Published in the present issue of THE LARYNGOSCOPE.)

**Expressly Hypertrophied Tonsils Causing Unusual Symptoms. DR. FIELDING O. LEWIS.**

Dr. Fielding O. Lewis presented an Italian patient, age 26, short in stature, weighing 210 pounds, who in the absence of any organic disease, exhibited the following symptoms: Dyspnoea, extreme drowsiness, almost falls asleep even when conversing, stifling at night and cyanosis, rapid gain in weight, 80 pounds in a comparatively short time. The tonsils were found enormously hypertrophied, obliterating the postnasal space. They were removed at the Pennsylvania Hospital by Dr. George M. Coates, under local anesthesia.

**Cases In Which Emetin Was Used for Nasal Conditions. DR DOUGLASS MACFARLAN.**

Dr. Douglass MacFarlan claims to have used emetin with benefit, in one-half per cent. solution, in cases of atrophic rhinitis, taking advantage of what he terms its antiseptic irritant action. In a case of maxillary sinusitis with secondary atrophy, following the intra-antral instillation of the solution, there was remarkable subsidence of the fetid discharge.

A chronic maxillary empyema in which the discharge persisted in spite of the free drainage, cleared up after one instillation of emetin. Although attempts to find amebae had failed, the response to this medication was considered significant.

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**War Deafness from Lesions of the Internal Ear. DR. COT, *Revue de Laryngologie, D'Otologie et de Rhinologie*, Jan. 15, 1916.**

In the majority of cases traumatism of the internal ear is due to an explosion near the patient. Deafness is the chief symptom, which in severe cases is usually permanent, but without tendency to become aggravated. Spontaneous nystagmus is frequently present. Iodide and bromide combined form the logical treatment; also counter-irritation over the mastoid. Inflations and massage should be avoided.

W. SCHEPPEGRELL.

